Periodske svote

Financijska matematika, IPS

Damir Horvat

FOI, Varaždin

Sadržaj

prvi zadatak

Zadatak 1

Julio štedi za novi auto. Uplaćuje 79 € *početkom svakog mjeseca kroz* 27 *mjeseci počevši od 1.6.2011.*

a) *Kolikim iznosom raspolaže 1.2.2016.?*

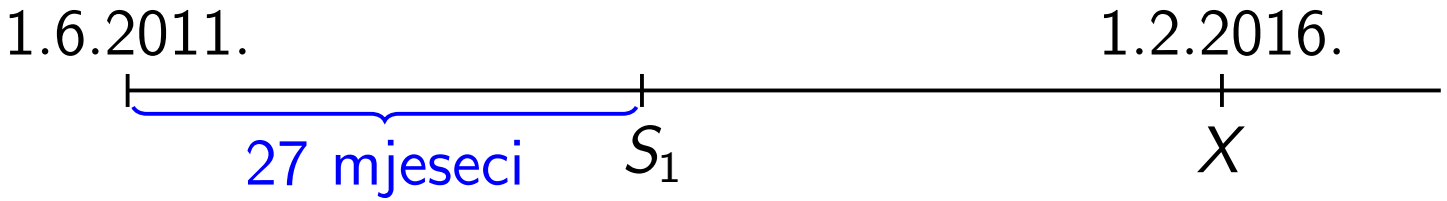
b) *Koliko novaca Julio mora ulagati kvartalno tijekom iduće tri godine kako bi tada, zajedno s uštedevinom, mogao kupiti auto vrijedan* 9 000 €*?*

Na raniju uštedevinu također se obračunavaju kamate. Godišnja kamatna stopa iznosi 6.3%*.*

Rješenje

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$

a)



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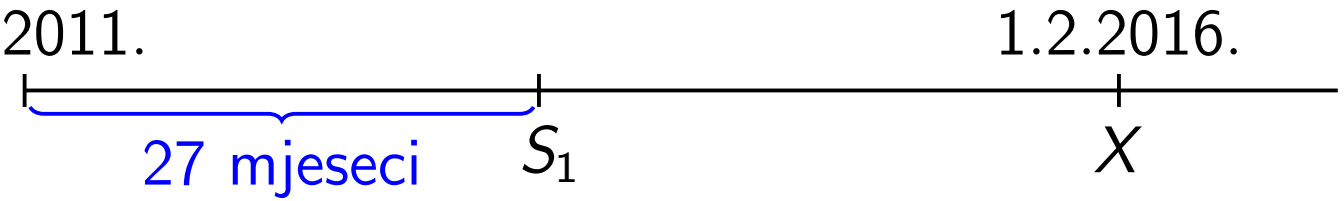

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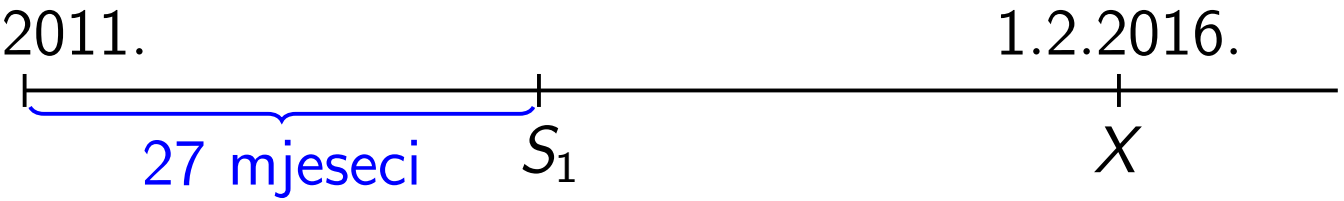

$$S_1 = R_1 \cdot r_1 \cdot \frac{r_1^{n_1} - 1}{r_1 - 1} = 79 \cdot \sqrt[12]{1.063} \cdot \frac{\sqrt[12]{1.063}^{27} - 1}{\sqrt[12]{1.063} - 1}$$

Rješenje

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$

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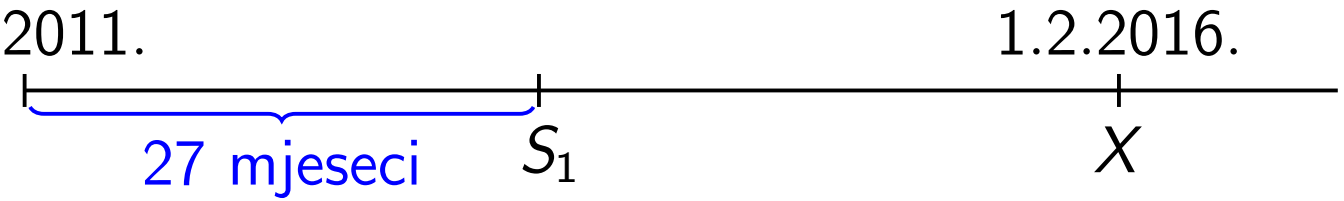

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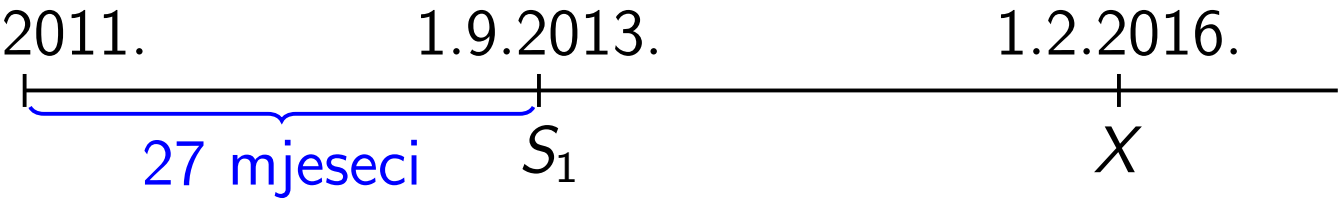

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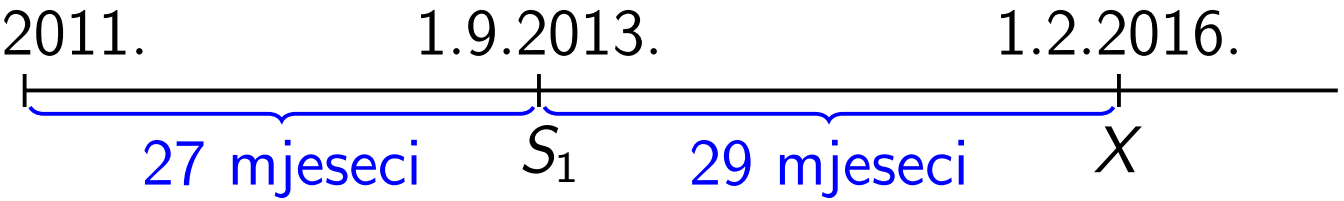

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$$X = S_1 \cdot r_1^{29}$$

Rješenje

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$

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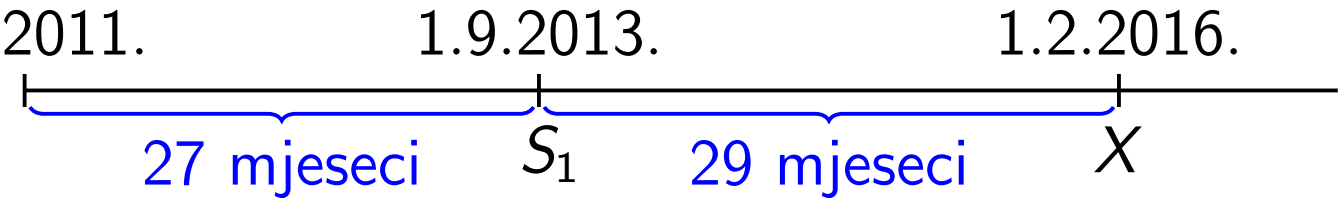

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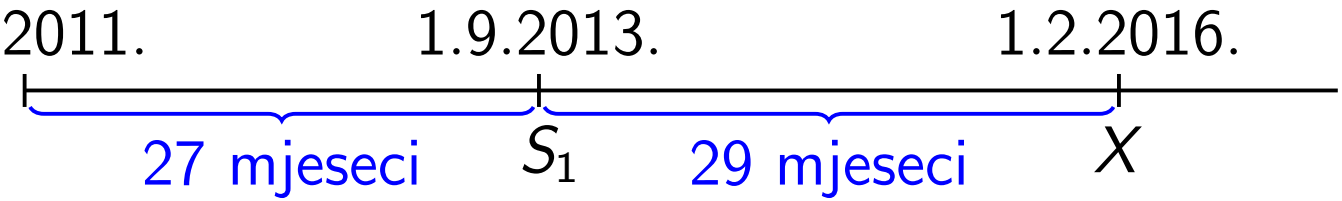

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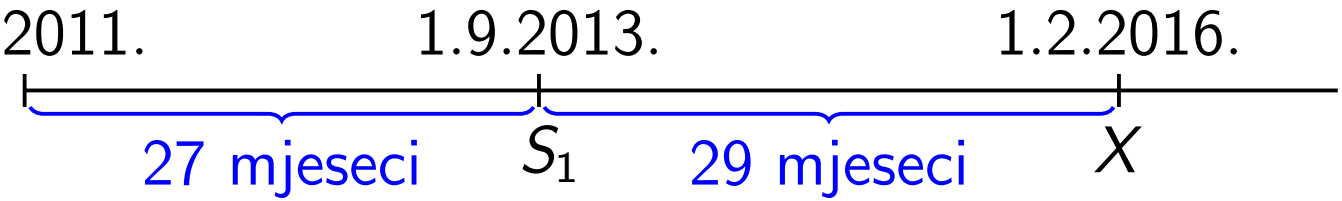
$$X = S_1 \cdot r_1^{29} = 2292.39 \cdot \sqrt[12]{1.063}^{29} = 2657.11$$

Rješenje

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$

a)



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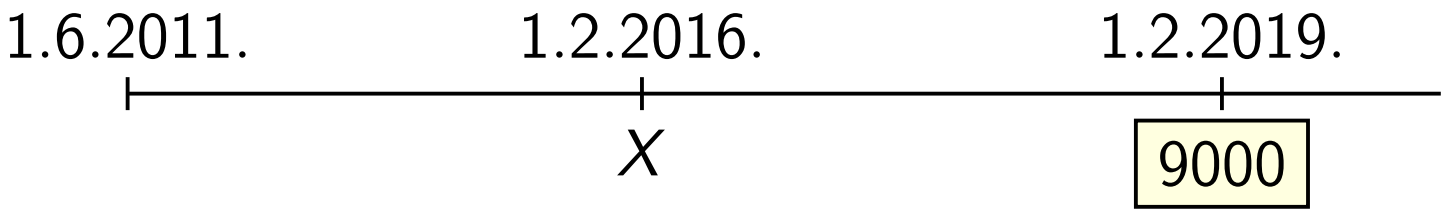
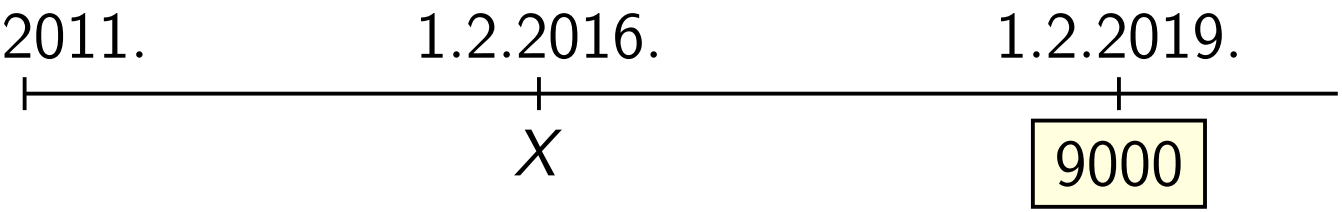
Julio 1.2.2016. raspolaže s 2657.11 €.

b)



$$S_2 = 9000 - X \cdot r_2^{12}$$

b)



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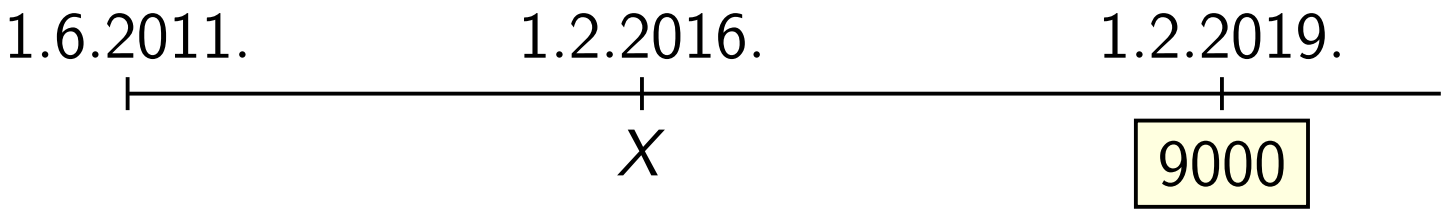
novac koji mu nedostaje

toliko bi imao 1.2.2019. da ništa ne uplaćuje

b)



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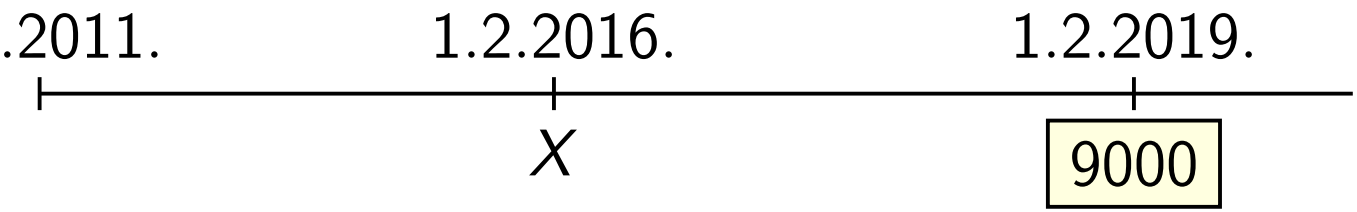

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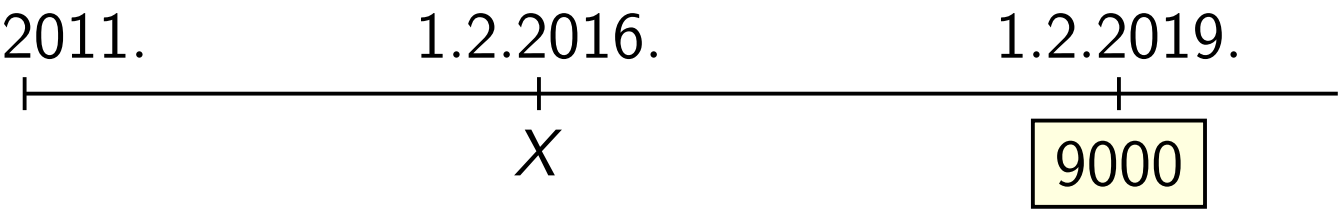

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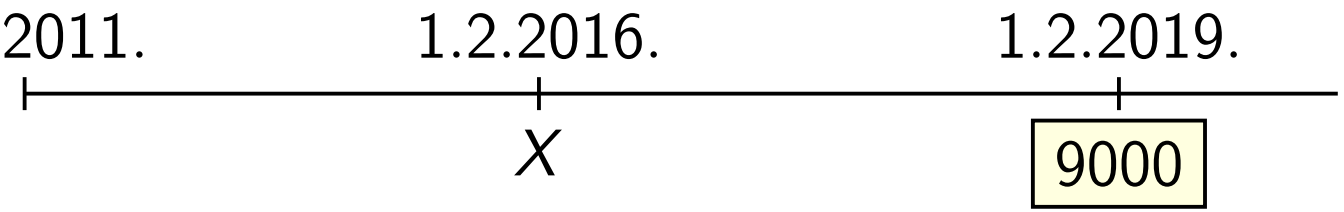
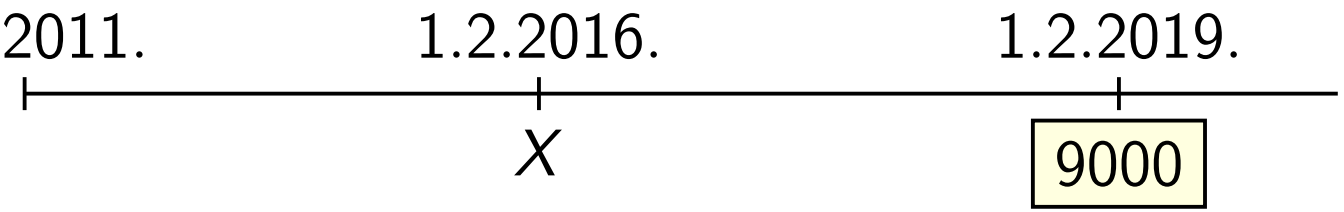


$$S_2 = R_2 \cdot r_2 \cdot \frac{r_2^{n_2} - 1}{r_2 - 1} \Big/ \cdot (r_2 - 1)$$

$$\frac{r_2^{n_2} - 1}{r_2 - 1}$$

$$r_2 - 1$$

b)



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$S_2(r_2 - 1)$ $\boxed{\quad - 1}$

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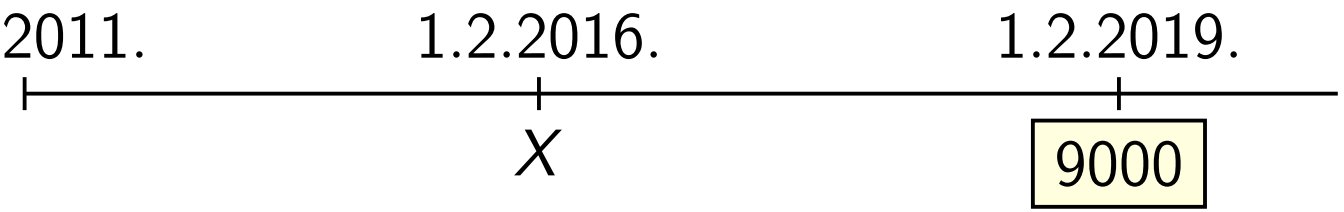

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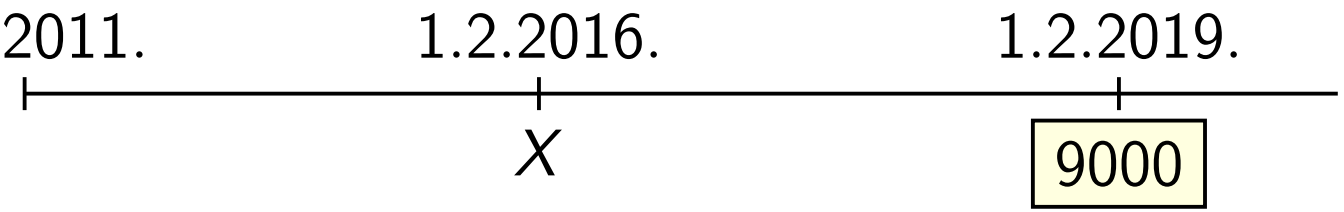

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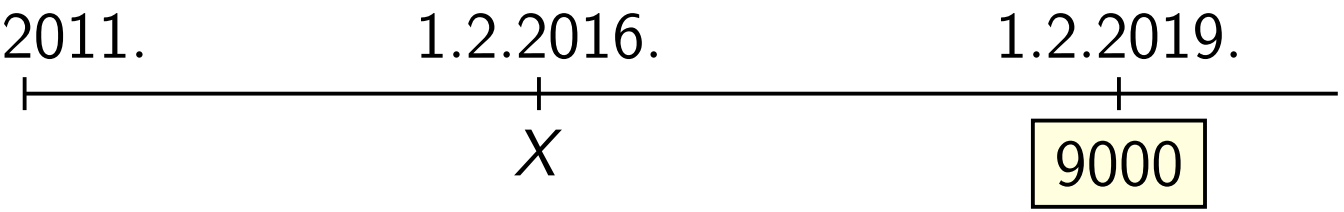

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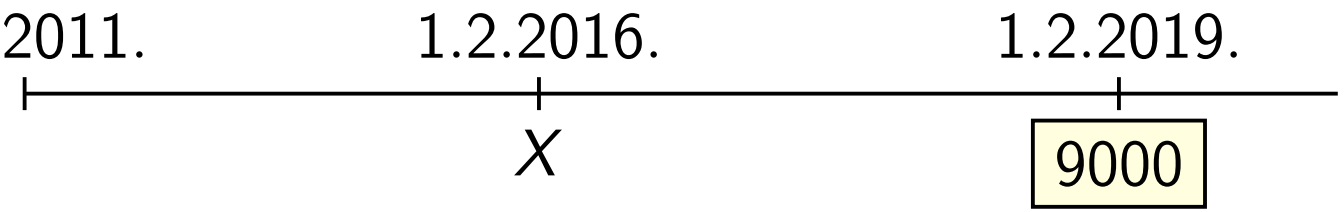

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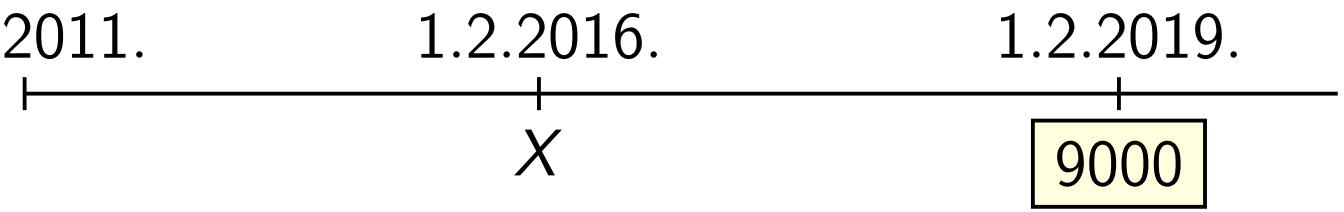
$$\frac{\quad - 1}{\quad - 1}$$

R_2

b)



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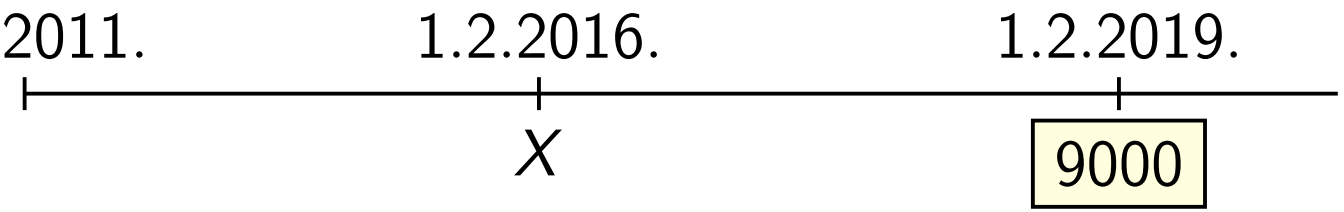
$$R_2 =$$

$$\frac{-1}{-1}$$

b)



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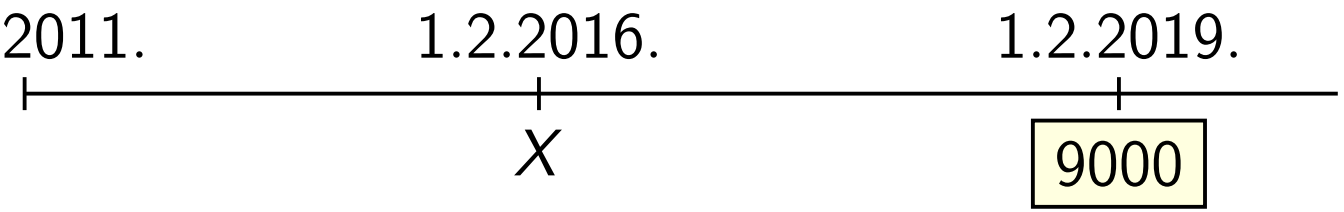
-1

-1

b)



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$$R_2 = \frac{S_2(r_2 - 1)}{}$$

$$\frac{}{-1}$$

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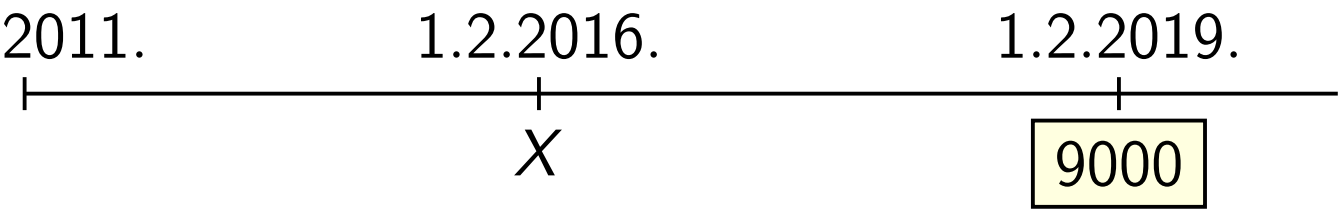

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$$R_2 = \frac{S_2(r_2 - 1)}{r_2\left(r_2^{n_2} - 1\right)}$$

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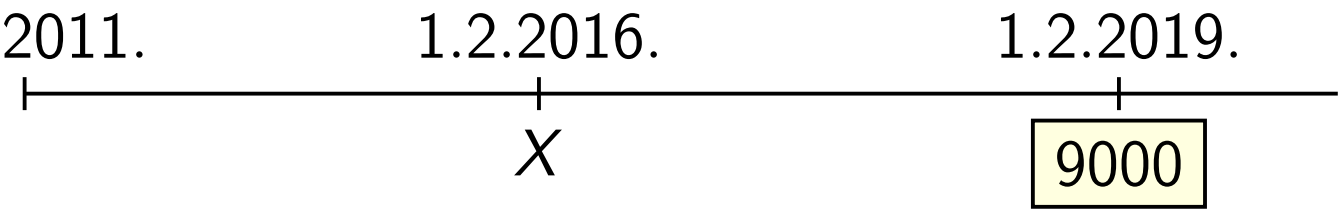

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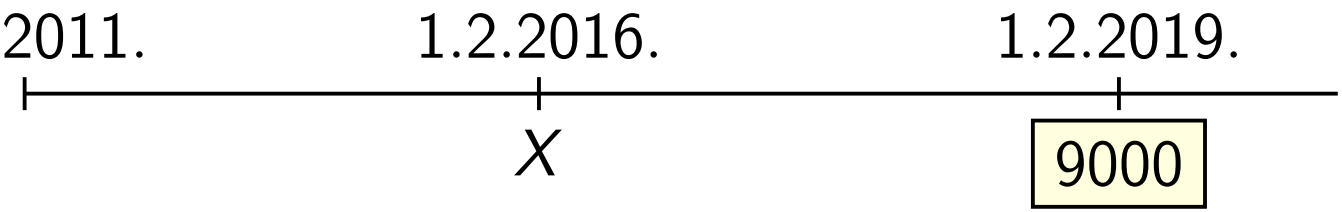
$$R_2 = \frac{S_2(r_2 - 1)}{r_2(r_2^{n_2} - 1)}$$

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$

b)



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$$n_2 = 12\,\text{kvartala}$$

$$R_2 = \frac{5808.39 \cdot \left(\sqrt[4]{1.063} - 1\right)}{\sqrt[4]{1.063} \cdot \left(\sqrt[4]{1.063}^{12} - 1\right)}$$

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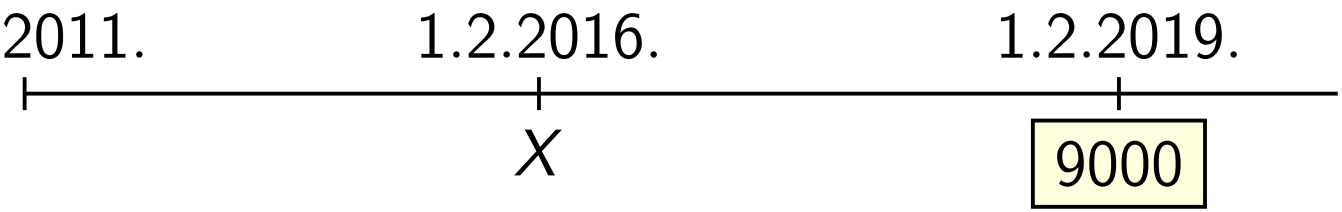

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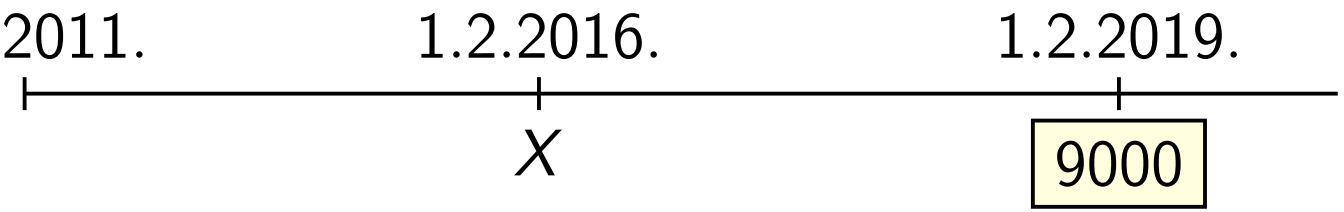
$$R_2 = \frac{5808.39 \cdot \left(\sqrt[4]{1.063} - 1\right)}{\sqrt[4]{1.063} \cdot \left(\sqrt[4]{1.063}^{12} - 1\right)} = 437.68$$

b)



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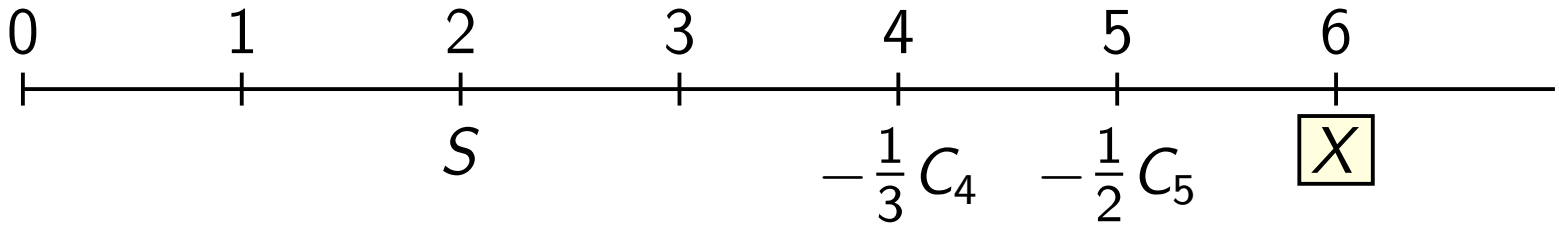
Tijekom iduće tri godine Julio kvartalno mora ulagati 437.68 €.

drugi zadatak

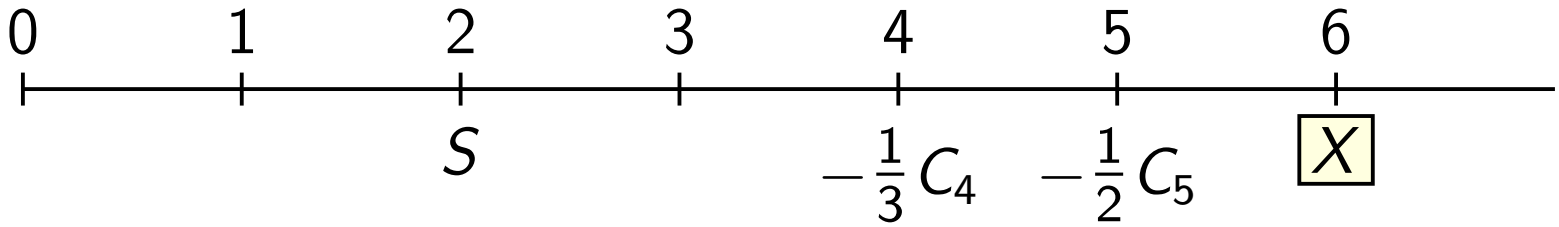
Zadatak 2

Netko uplati 12 *puta u razmacima od* 2 *mjeseca* 2000 *kn početkom razdoblja. Četiri godine nakon prve uplate podigne trećinu raspoloživog iznosa, a godinu dana kasnije još polovicu iznosa s kojim raspolaže u tom trenutku. Koliko novaca ima šest godina nakon prvog ulaganja ako godišnja kamatna stopa iznosi* 9.2%*?*

Rješenje

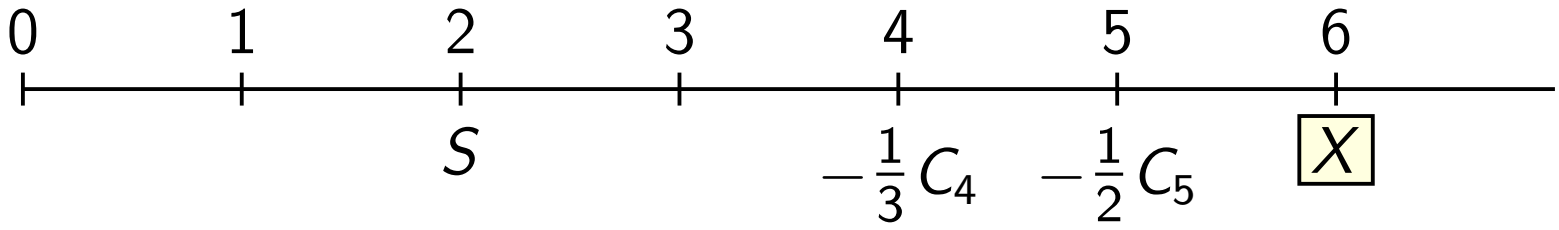


Rješenje



$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$

Rješenje

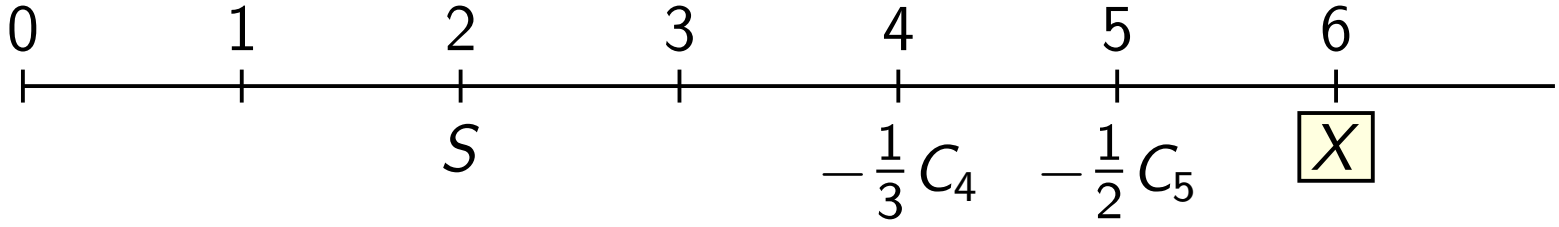


dvomjesečni dekurzivni kamatni faktor

$$\boxed{r = \sqrt[6]{1.092}}$$

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 2000 \cdot \sqrt[6]{1.092} \cdot \frac{\sqrt[6]{1.092}^{12} - 1}{\sqrt[6]{1.092} - 1}$$

Rješenje

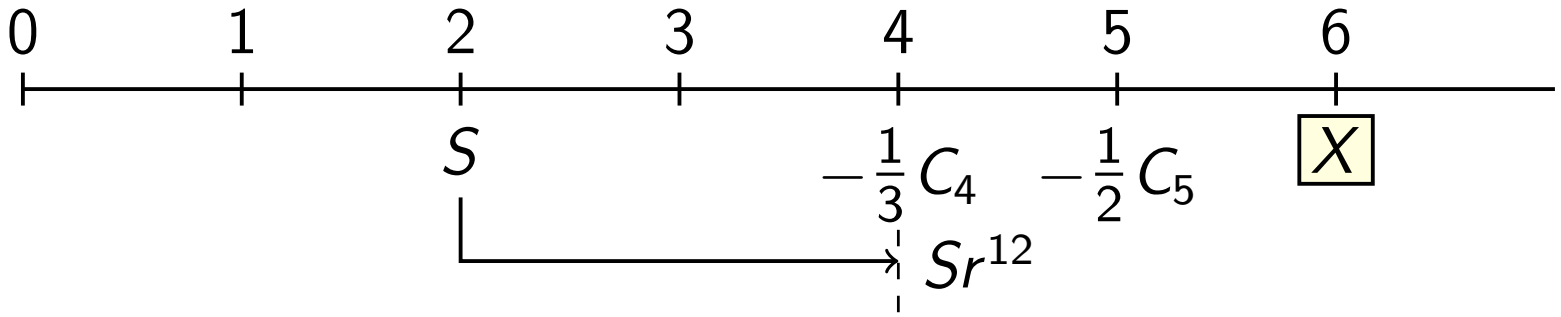


dvomjesečni dekurzivni kamatni faktor

$$\boxed{r = \sqrt[6]{1.092}}$$

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 2000 \cdot \sqrt[6]{1.092} \cdot \frac{\sqrt[6]{1.092}^{12} - 1}{\sqrt[6]{1.092} - 1} = 26\,434.78$$

Rješenje



dvomjesečni dekurzivni

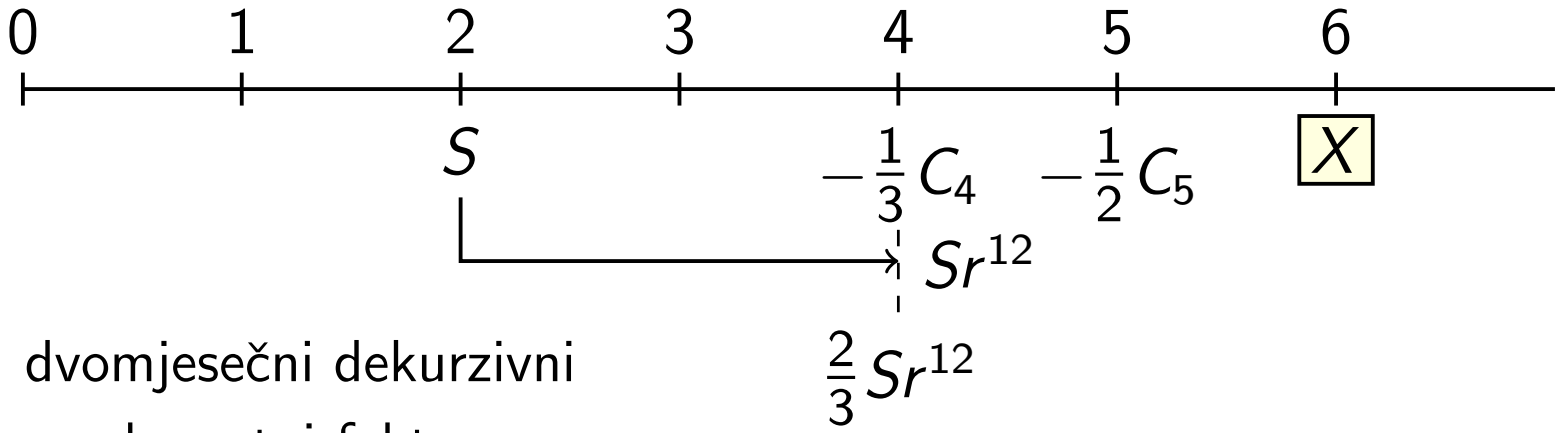
kamatni faktor

$$\boxed{r = \sqrt[6]{1.092}}$$

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 2000 \cdot \sqrt[6]{1.092} \cdot \frac{\sqrt[6]{1.092}^{12} - 1}{\sqrt[6]{1.092} - 1} = 26\,434.78$$

$$Sr^{12}$$

Rješenje



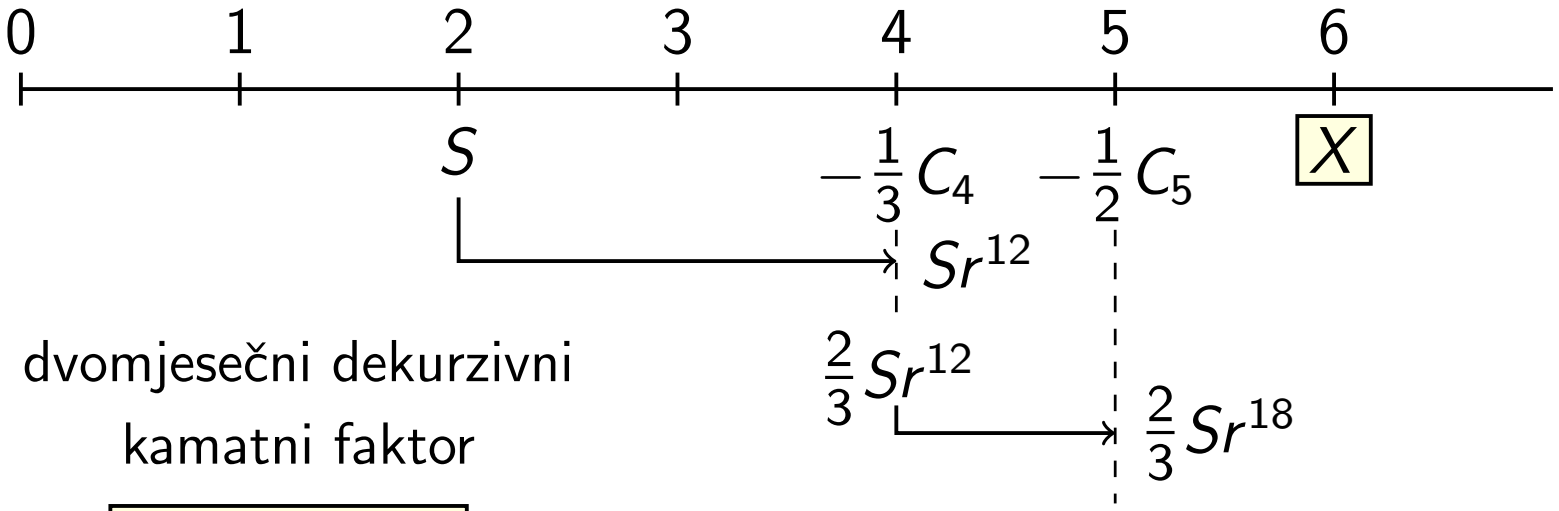
dvomjesečni dekurzivni kamatni faktor

$$\boxed{r = \sqrt[6]{1.092}}$$

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 2000 \cdot \sqrt[6]{1.092} \cdot \frac{\sqrt[6]{1.092}^{12} - 1}{\sqrt[6]{1.092} - 1} = 26\,434.78$$

$$\frac{2}{3}\left(Sr^{12}\right)$$

Rješenje



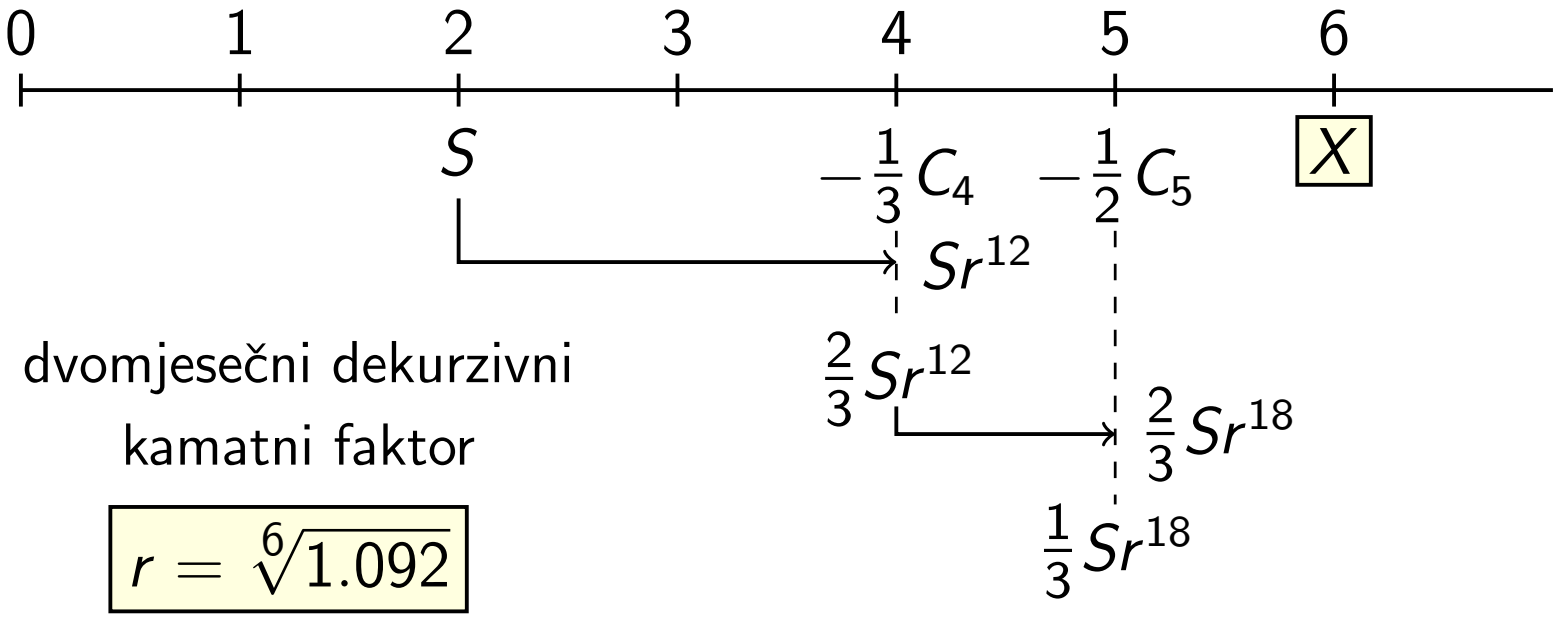
dvomjesečni dekurzivni kamatni faktor

$$r = \sqrt[6]{1.092}$$

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 2000 \cdot \sqrt[6]{1.092} \cdot \frac{\sqrt[6]{1.092}^{12} - 1}{\sqrt[6]{1.092} - 1} = 26\,434.78$$

$$\left[\frac{2}{3}\left(Sr^{12}\right)\right] \cdot r^6$$

Rješenje



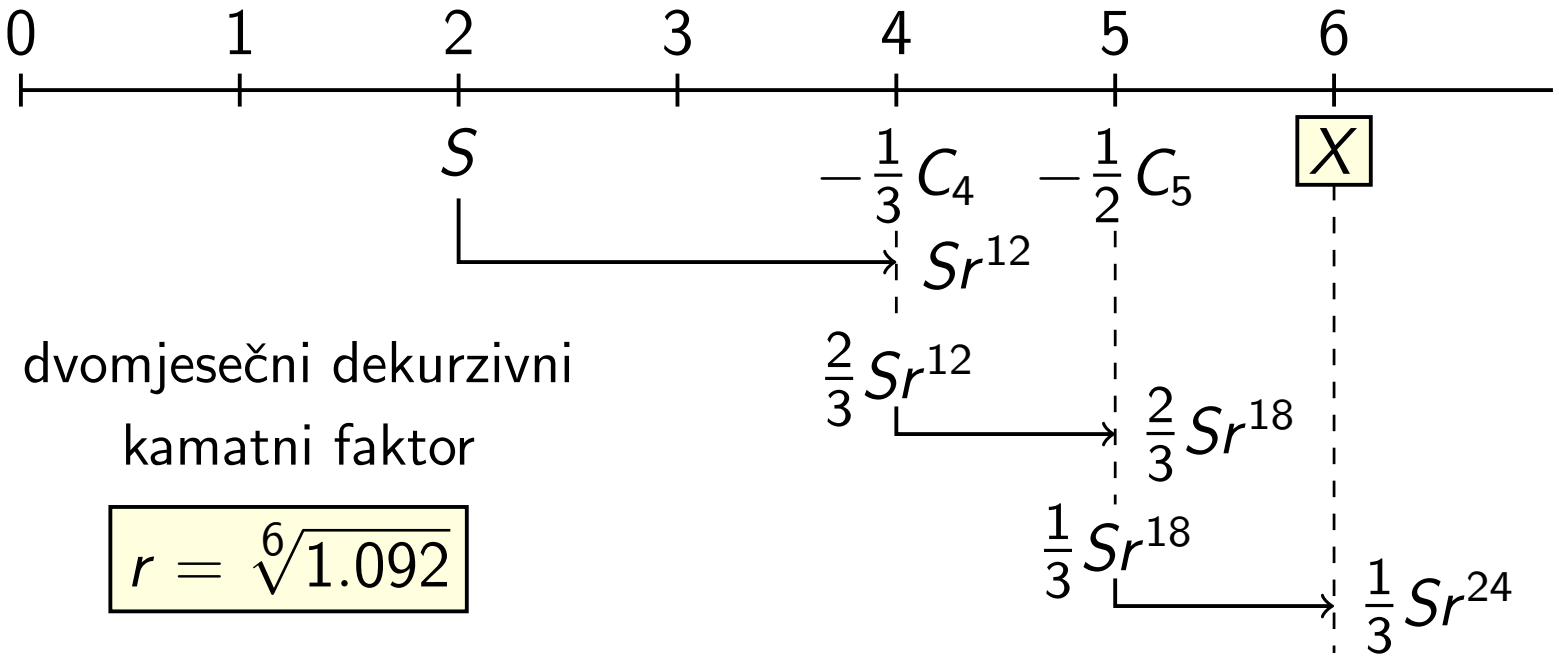
dvomjesečni dekurzivni kamatni faktor

$$\boxed{r = \sqrt[6]{1.092}}$$

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 2000 \cdot \sqrt[6]{1.092} \cdot \frac{\sqrt[6]{1.092}^{12} - 1}{\sqrt[6]{1.092} - 1} = 26\,434.78$$

$$\frac{1}{2}\left\{ \left[\frac{2}{3}\left(Sr^{12}\right) \right] \cdot r^6 \right\}$$

Rješenje



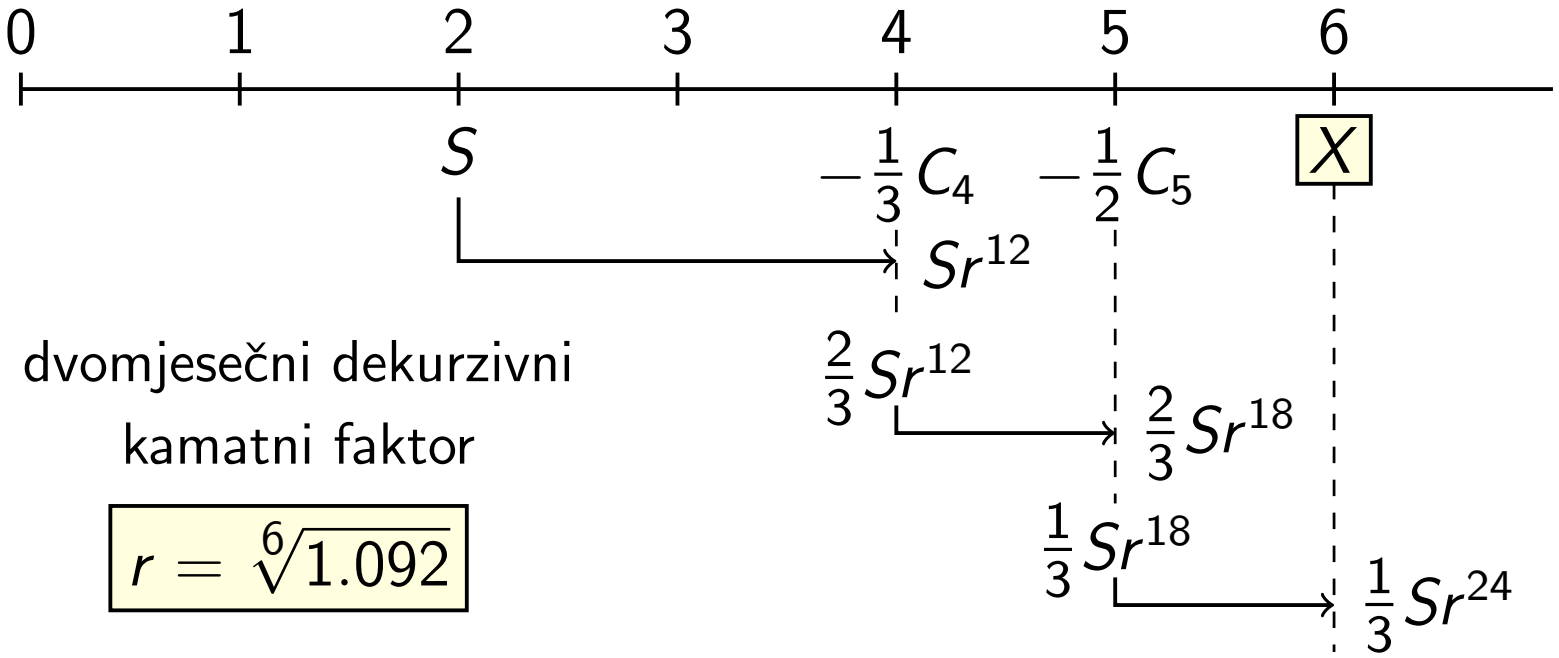
dvomjesečni dekurzivni kamatni faktor

$$\boxed{r = \sqrt[6]{1.092}}$$

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 2000 \cdot \sqrt[6]{1.092} \cdot \frac{\sqrt[6]{1.092}^{12} - 1}{\sqrt[6]{1.092} - 1} = 26\,434.78$$

$$X = \frac{1}{2}\left\{ \left[\frac{2}{3}\left(Sr^{12}\right) \right] \cdot r^6 \right\} \cdot r^6$$

Rješenje



dvomjesečni dekurzivni kamatni faktor

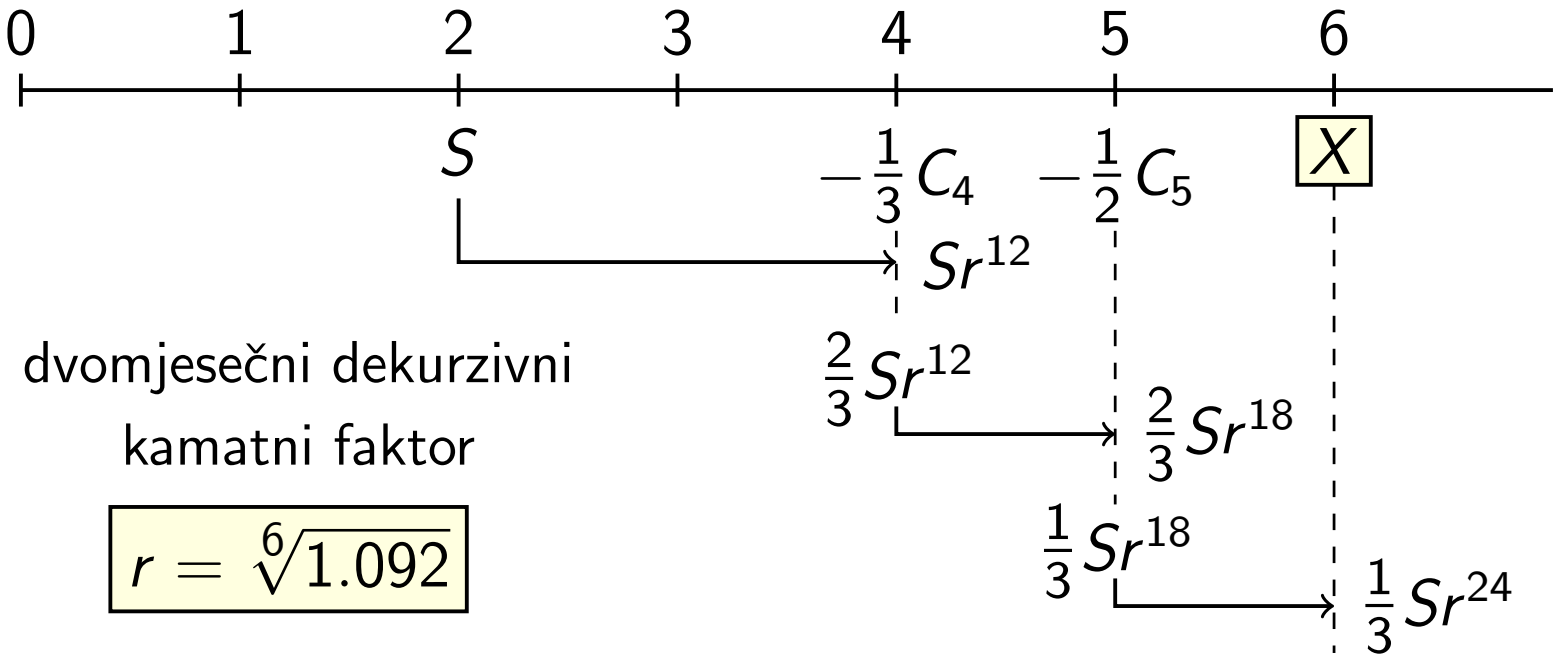
$$\boxed{r = \sqrt[6]{1.092}}$$

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 2000 \cdot \sqrt[6]{1.092} \cdot \frac{\sqrt[6]{1.092}^{12} - 1}{\sqrt[6]{1.092} - 1} = 26\,434.78$$

$$X = \frac{1}{2}\left\{ \left[\frac{2}{3}\left(Sr^{12}\right) \right] \cdot r^6 \right\} \cdot r^6$$

$$X = \frac{1}{3}Sr^{24}$$

Rješenje



dvomjesečni dekurzivni kamatni faktor

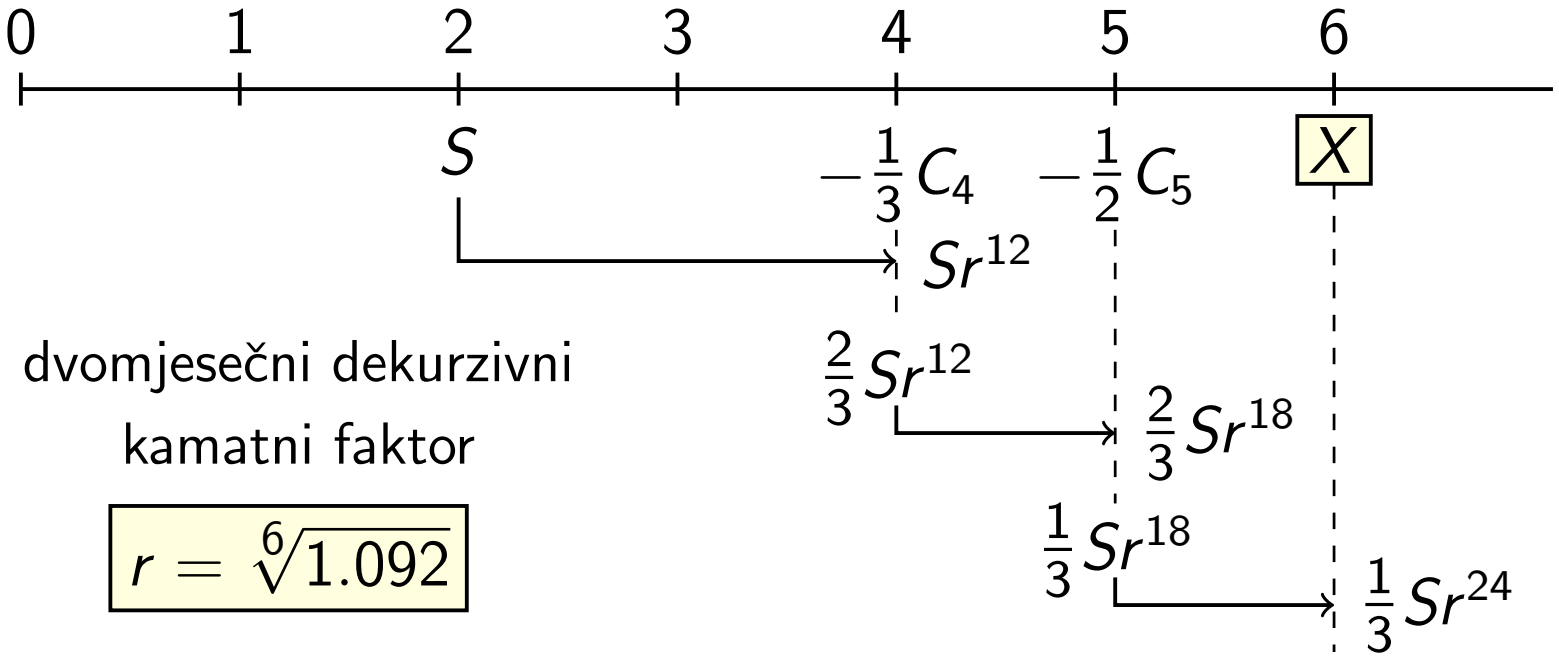
$$\boxed{r = \sqrt[6]{1.092}}$$

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 2000 \cdot \sqrt[6]{1.092} \cdot \frac{\sqrt[6]{1.092}^{12} - 1}{\sqrt[6]{1.092} - 1} = 26\,434.78$$

$$X = \frac{1}{2}\left\{ \left[\frac{2}{3}\left(Sr^{12}\right) \right] \cdot r^6 \right\} \cdot r^6$$

$$X = \frac{1}{3}Sr^{24} = \frac{1}{3} \cdot 26\,434.78 \cdot \sqrt[6]{1.092}^{24}$$

Rješenje



dvomjesečni dekurzivni kamatni faktor

$$\boxed{r = \sqrt[6]{1.092}}$$

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 2000 \cdot \sqrt[6]{1.092} \cdot \frac{\sqrt[6]{1.092}^{12} - 1}{\sqrt[6]{1.092} - 1} = 26\,434.78$$

$$X = \frac{1}{2}\left\{ \left[\frac{2}{3}\left(Sr^{12}\right) \right] \cdot r^6 \right\} \cdot r^6$$

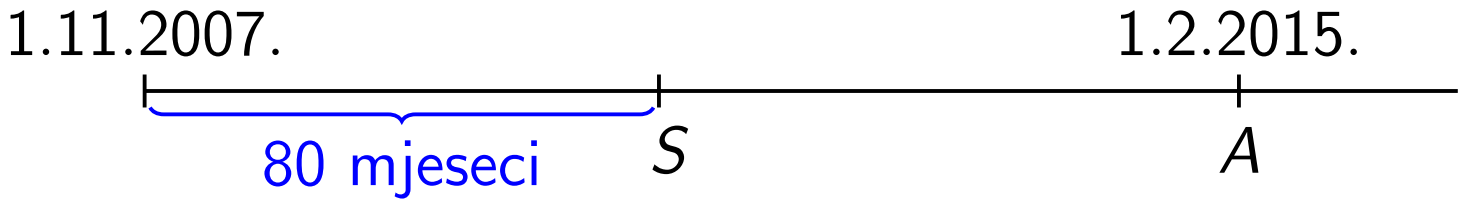
$$X = \frac{1}{3}Sr^{24} = \frac{1}{3} \cdot 26\,434.78 \cdot \sqrt[6]{1.092}^{24} = 12\,529.82$$

treći zadatak

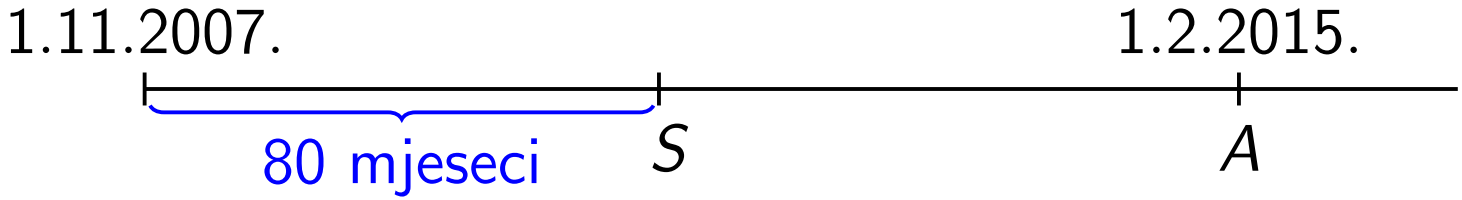
Zadatak 3

Roditelji su štedjeli za studij svoje djece. Od 1.11.2007. na račun su uplaćivali 420 € *početkom svakog mjeseca tijekom* 80 *mjeseci. Od 1.2.2015. svako od dvoje djece dobiva mjesečnu rentu tijekom iduće četiri godine. O kojem se iznosu radi ako je godišnja kamatna stopa* 4.5%*?*

Rješenje

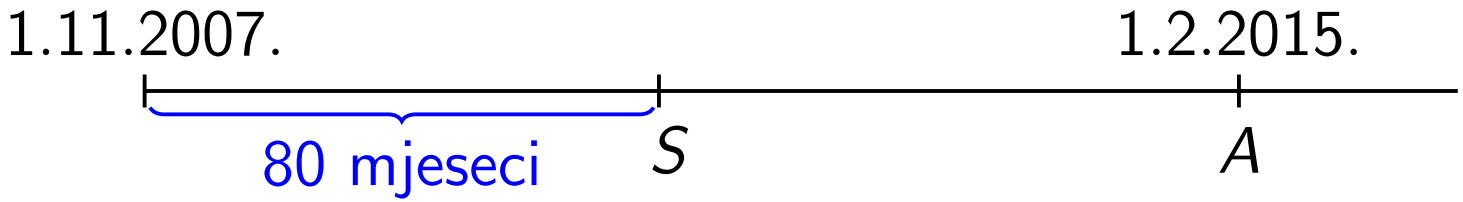


Rješenje



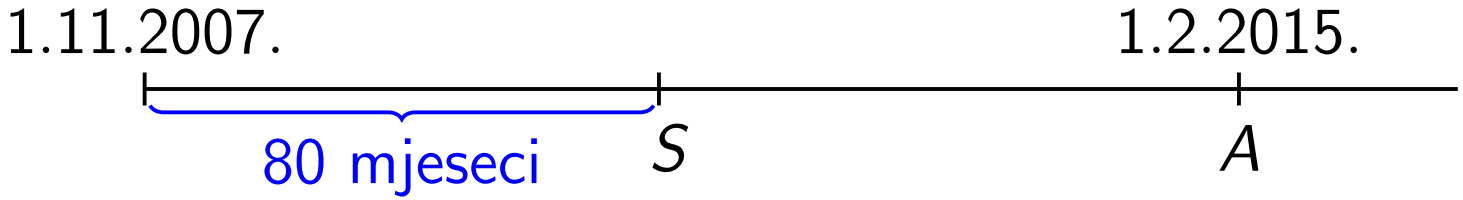
$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$

Rješenje



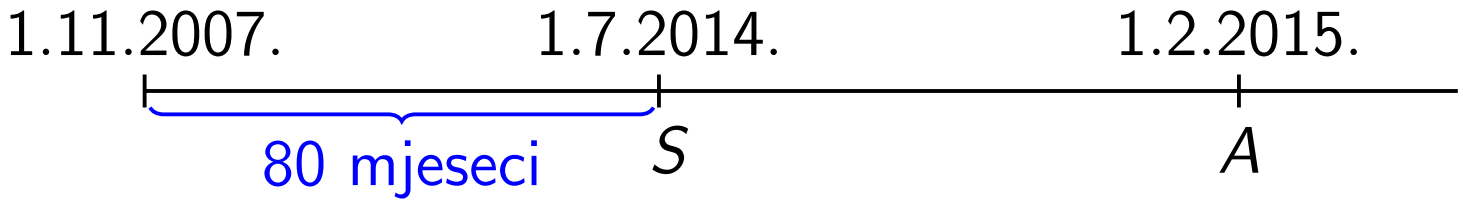
$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 420 \cdot \sqrt[12]{1.045} \cdot \frac{\sqrt[12]{1.045}^{80} - 1}{\sqrt[12]{1.045} - 1}$$

Rješenje



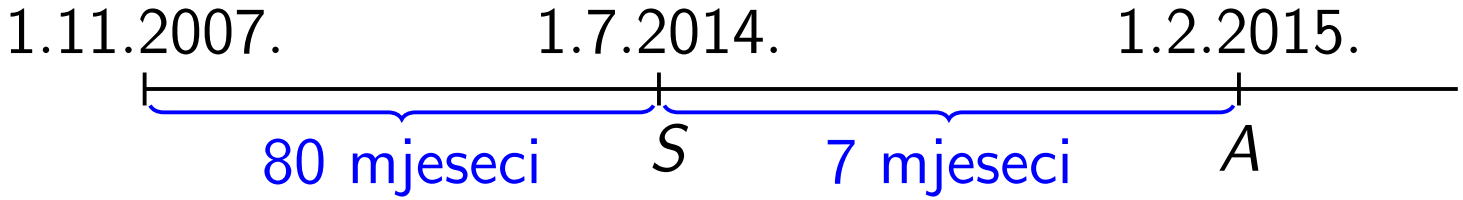
$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 420 \cdot \sqrt[12]{1.045} \cdot \frac{\sqrt[12]{1.045}^{80} - 1}{\sqrt[12]{1.045} - 1} = 39\,121.33$$

Rješenje



$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 420 \cdot \sqrt[12]{1.045} \cdot \frac{\sqrt[12]{1.045}^{80} - 1}{\sqrt[12]{1.045} - 1} = 39\,121.33$$

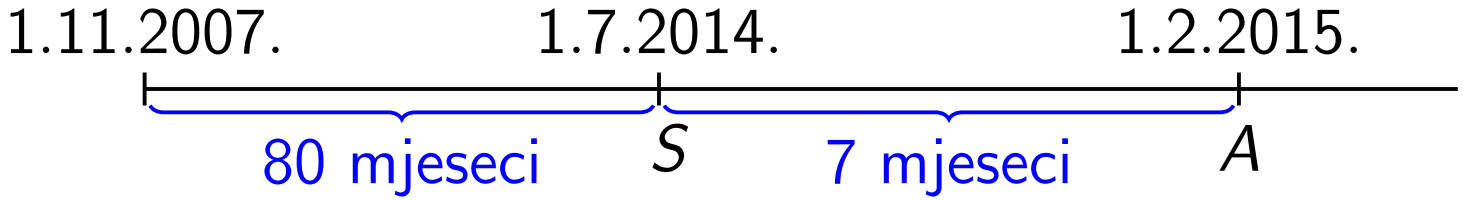
Rješenje



$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 420 \cdot \sqrt[12]{1.045} \cdot \frac{\sqrt[12]{1.045}^{80} - 1}{\sqrt[12]{1.045} - 1} = 39\,121.33$$

$$A = S \cdot r^7$$

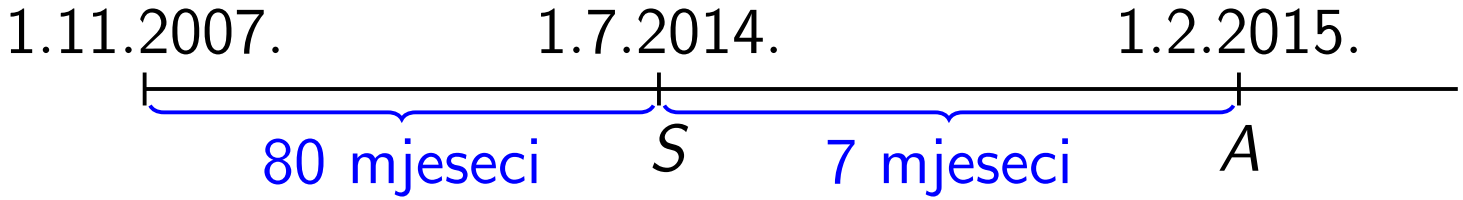
Rješenje



$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 420 \cdot \sqrt[12]{1.045} \cdot \frac{\sqrt[12]{1.045}^{80} - 1}{\sqrt[12]{1.045} - 1} = 39\,121.33$$

$$A = S \cdot r^7 = 39\,121.33 \cdot \sqrt[12]{1.045}^{7}$$

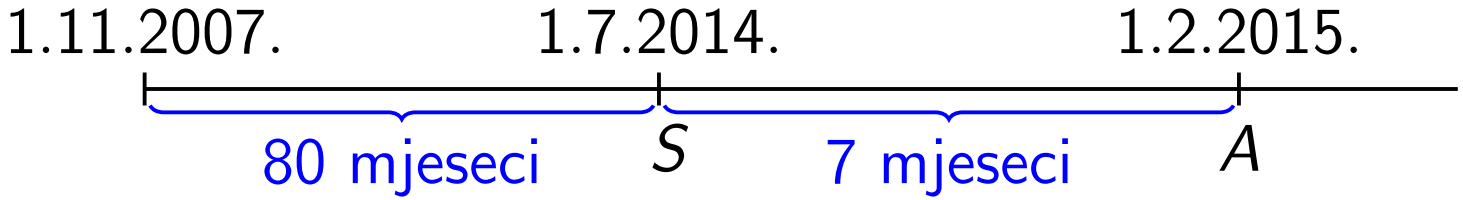
Rješenje



$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 420 \cdot \sqrt[12]{1.045} \cdot \frac{\sqrt[12]{1.045}^{80} - 1}{\sqrt[12]{1.045} - 1} = 39\,121.33$$

$$A = S \cdot r^7 = 39\,121.33 \cdot \sqrt[12]{1.045}^{7} = 40\,138.84$$

Rješenje

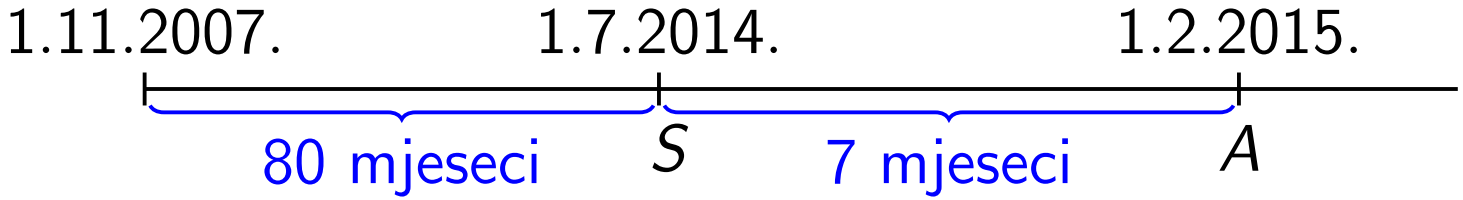


$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 420 \cdot \sqrt[12]{1.045} \cdot \frac{\sqrt[12]{1.045}^{80} - 1}{\sqrt[12]{1.045} - 1} = 39\,121.33$$

$$A = S \cdot r^7 = 39\,121.33 \cdot \sqrt[12]{1.045}^{7} = 40\,138.84$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r - 1)}$$

Rješenje

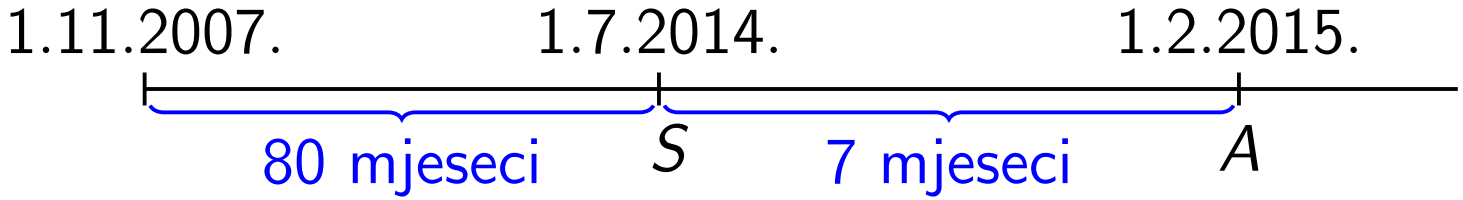


$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 420 \cdot \sqrt[12]{1.045} \cdot \frac{\sqrt[12]{1.045}^{80} - 1}{\sqrt[12]{1.045} - 1} = 39\,121.33$$

$$A = S \cdot r^7 = 39\,121.33 \cdot \sqrt[12]{1.045}^{7} = 40\,138.84$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r - 1)} \qquad R = \frac{A \cdot r^{n-1} \cdot (r - 1)}{r^n - 1}$$

Rješenje



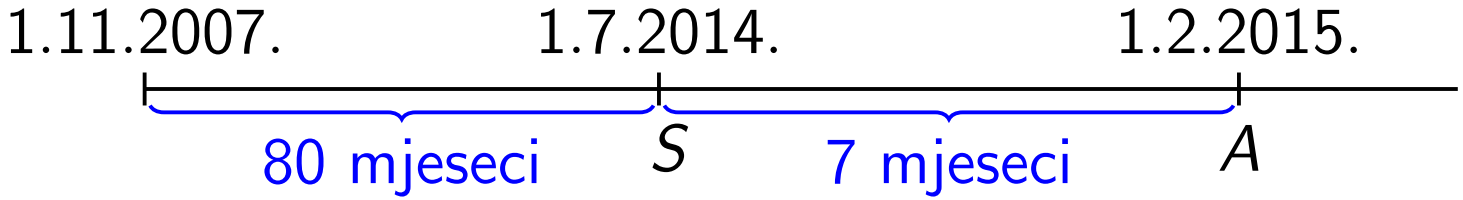
$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 420 \cdot \sqrt[12]{1.045} \cdot \frac{\sqrt[12]{1.045}^{80} - 1}{\sqrt[12]{1.045} - 1} = 39\,121.33$$

$$A = S \cdot r^7 = 39\,121.33 \cdot \sqrt[12]{1.045}^{7} = 40\,138.84$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r - 1)} \qquad R = \frac{A \cdot r^{n-1} \cdot (r - 1)}{r^n - 1}$$

$$R = \frac{40\,138.84 \cdot \sqrt[12]{1.045}^{47} \cdot (\sqrt[12]{1.045} - 1)}{\sqrt[12]{1.045}^{48} - 1}$$

Rješenje



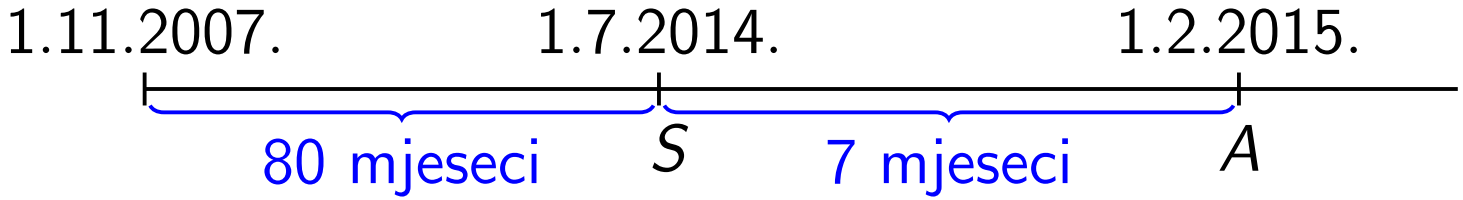
$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 420 \cdot \sqrt[12]{1.045} \cdot \frac{\sqrt[12]{1.045}^{80} - 1}{\sqrt[12]{1.045} - 1} = 39\,121.33$$

$$A = S \cdot r^7 = 39\,121.33 \cdot \sqrt[12]{1.045}^{7} = 40\,138.84$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r - 1)} \qquad R = \frac{A \cdot r^{n-1} \cdot (r - 1)}{r^n - 1}$$

$$R = \frac{40\,138.84 \cdot \sqrt[12]{1.045}^{47} \cdot (\sqrt[12]{1.045} - 1)}{\sqrt[12]{1.045}^{48} - 1} = 910.33$$

Rješenje



$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = 420 \cdot \sqrt[12]{1.045} \cdot \frac{\sqrt[12]{1.045}^{80} - 1}{\sqrt[12]{1.045} - 1} = 39\,121.33$$

$$A = S \cdot r^7 = 39\,121.33 \cdot \sqrt[12]{1.045}^{7} = 40\,138.84$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r - 1)} \qquad R = \frac{A \cdot r^{n-1} \cdot (r - 1)}{r^n - 1}$$

$$R = \frac{40\,138.84 \cdot \sqrt[12]{1.045}^{47} \cdot (\sqrt[12]{1.045} - 1)}{\sqrt[12]{1.045}^{48} - 1} = 910.33$$

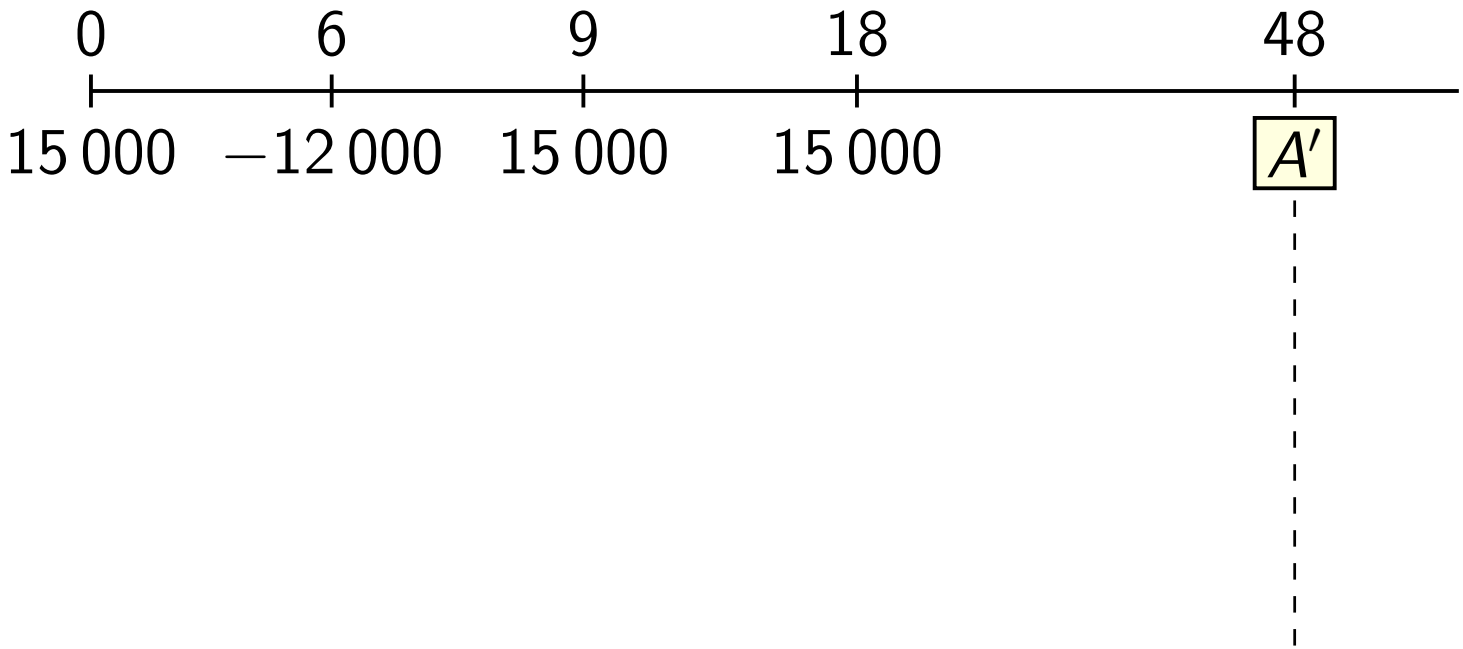
Svako dijete dobiva mjesečno 455.16 €.

četvrti zadatak

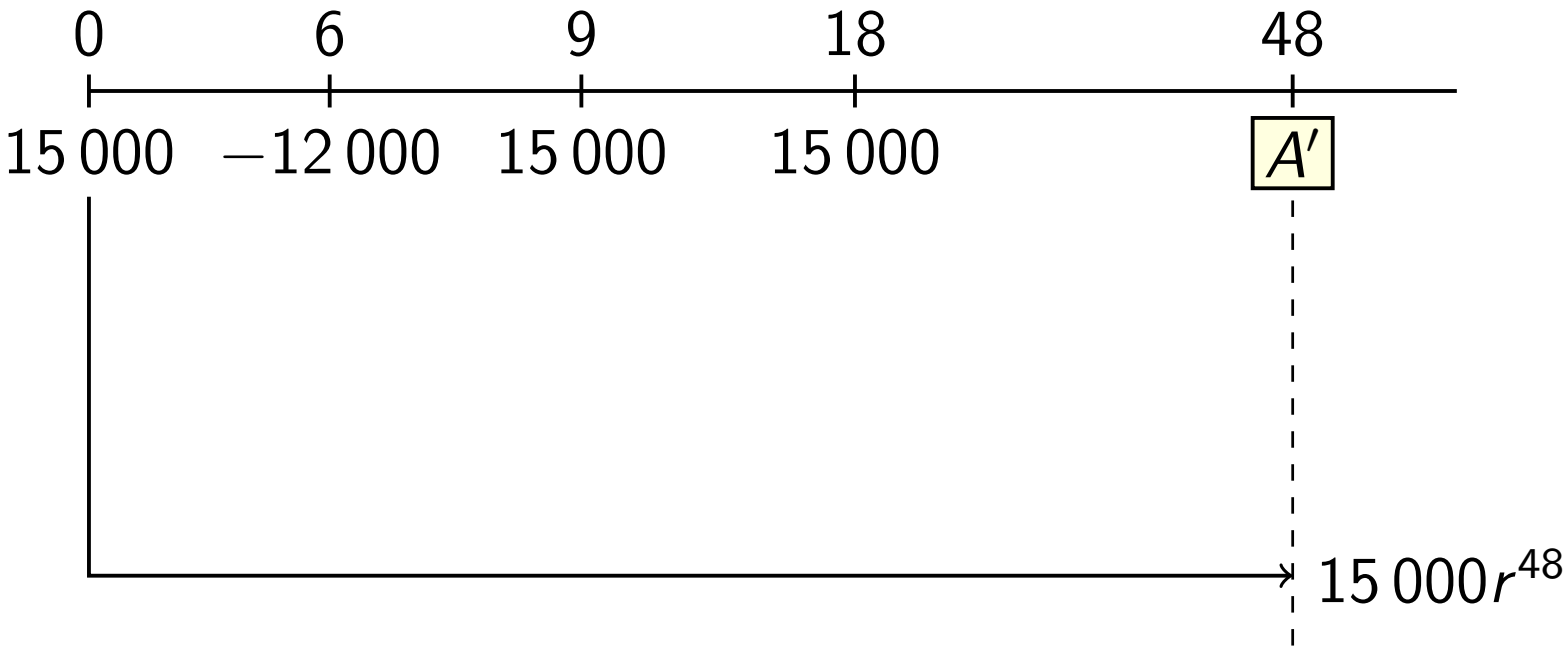
Zadatak 4

Netko uplati tri puta u razmacima od 9 *mjeseci* 15 000 *kn uz godišnju kamatnu stopu* 5.5%. *Šest mjeseci nakon prve uplate podigne* 12 000 *kn. Na osnovu svote s kojom raspolaže četiri godine nakon prve uplate želi primati postnumerando mjesečnu rentu visine* 3500 *kn. Koliko će takvih renti primiti i kolika je krnja isplata?*

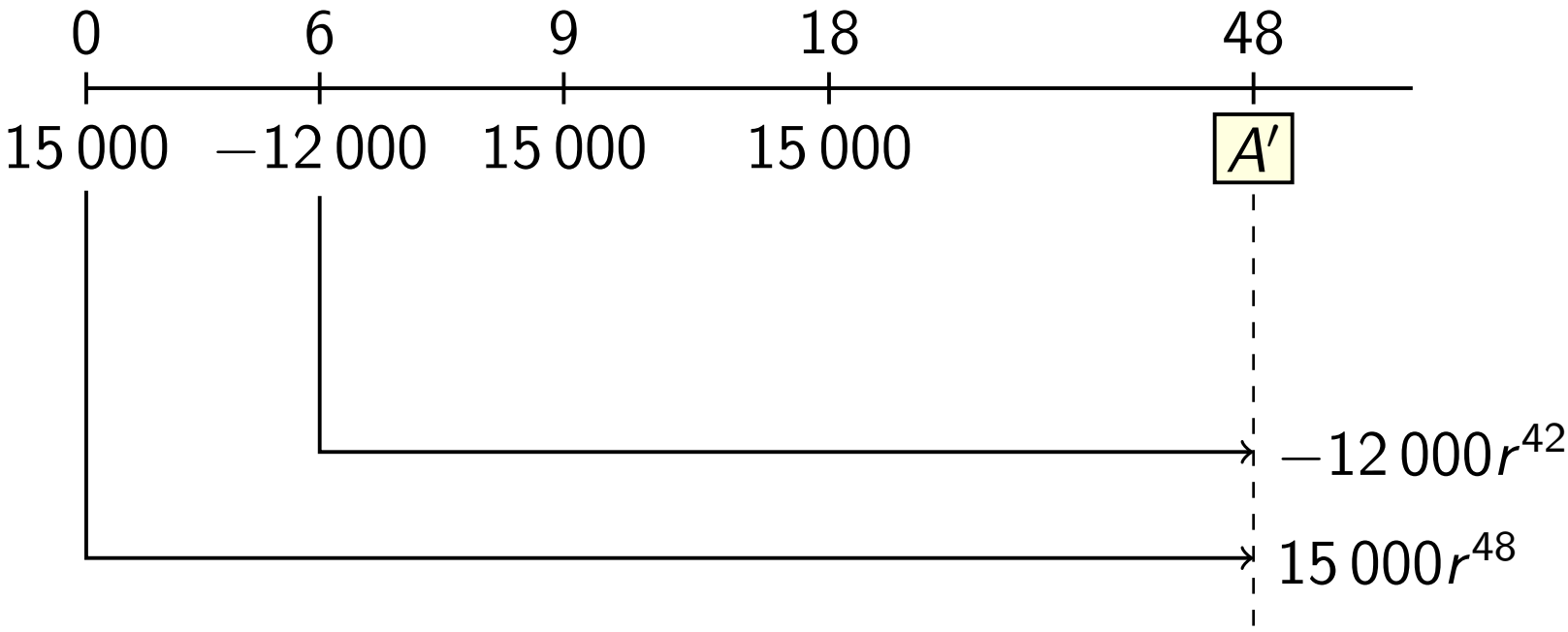
Rješenje



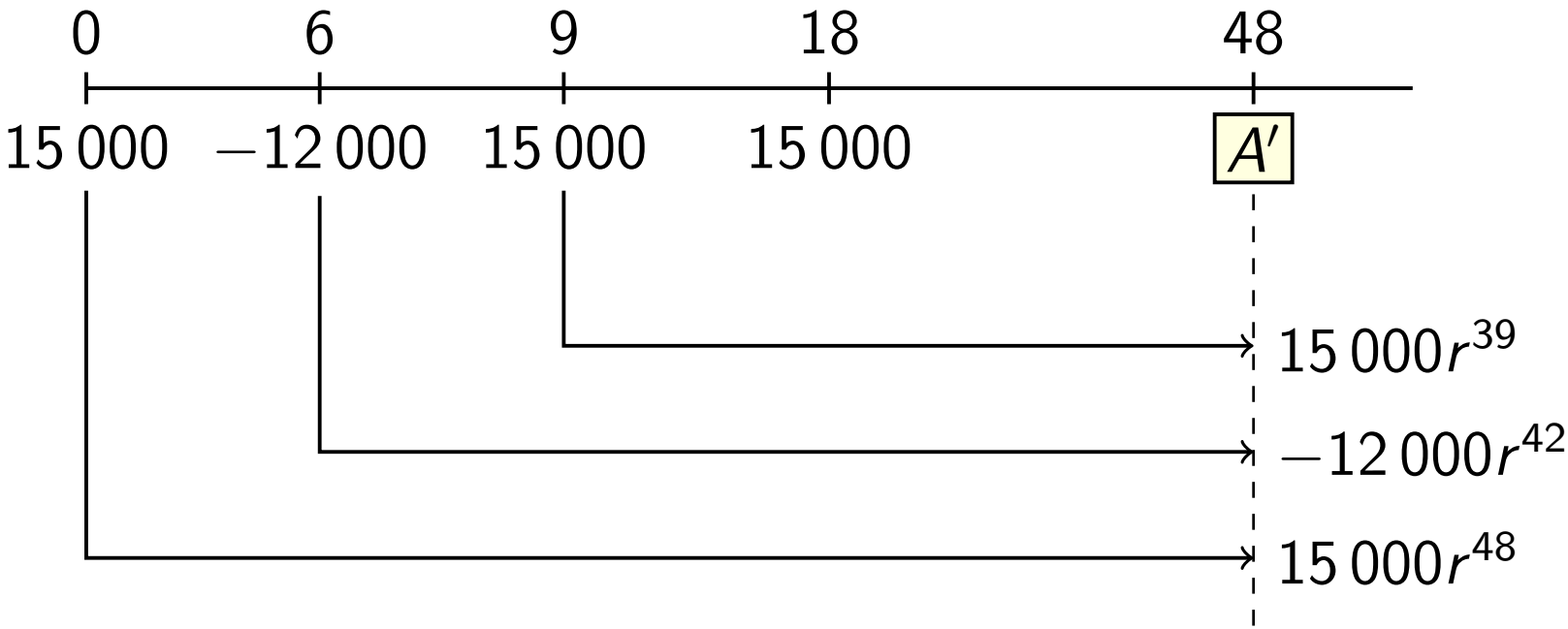
Rješenje



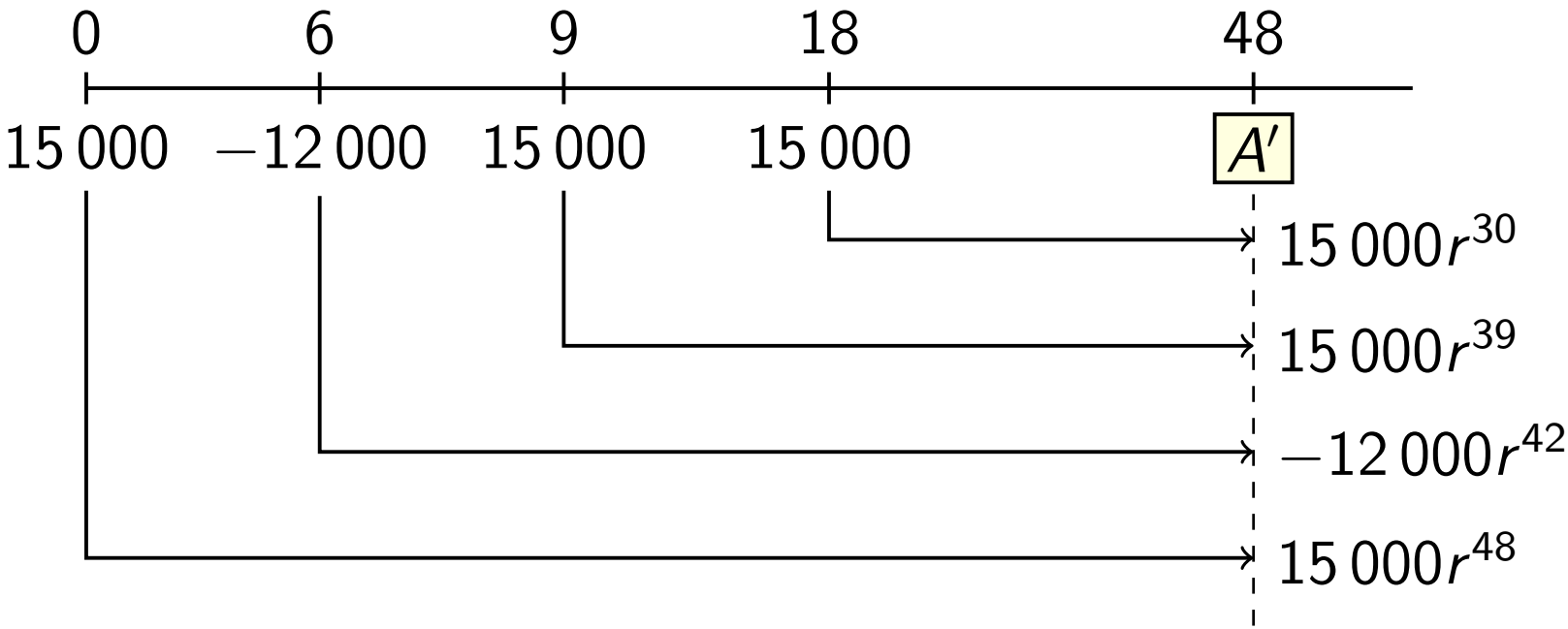
Rješenje



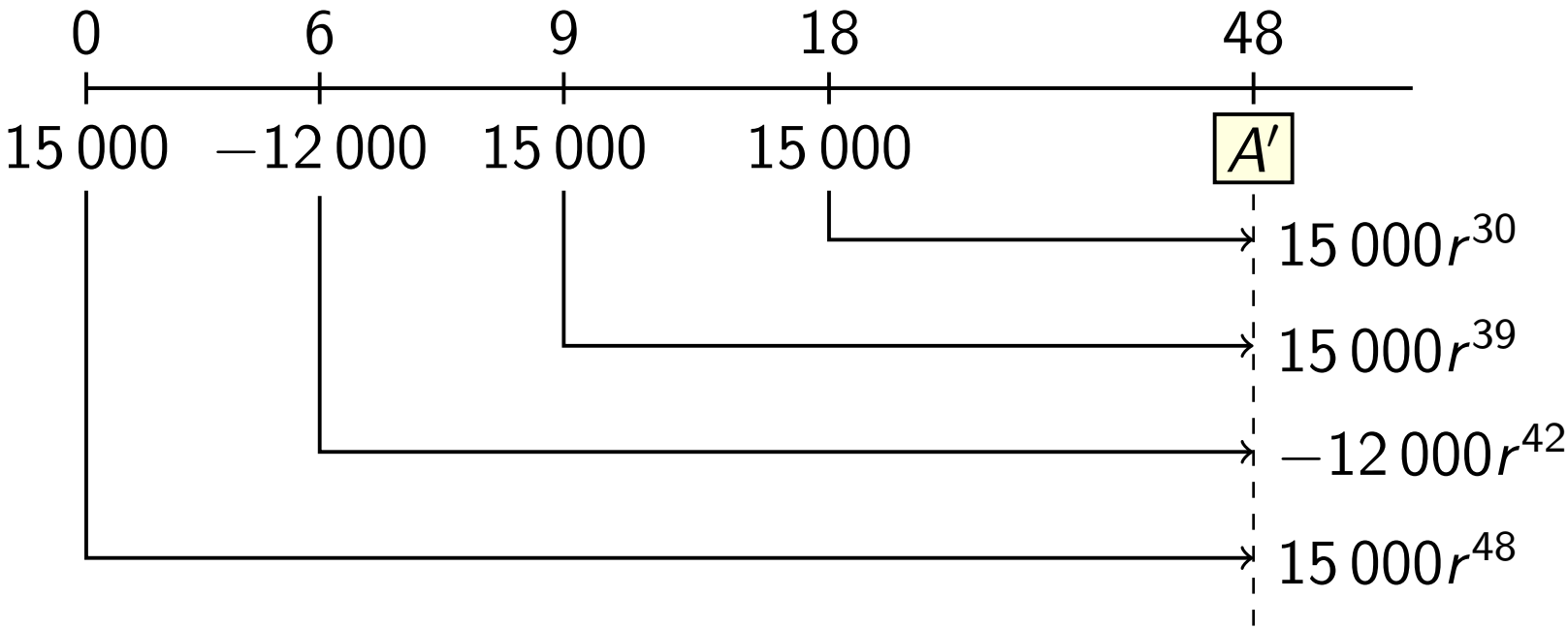
Rješenje


0
6
9
18
48
15 000
−12 000
15 000
15 000
A′
15 000r^39
−12 000r^42
15 000r^48

Rješenje

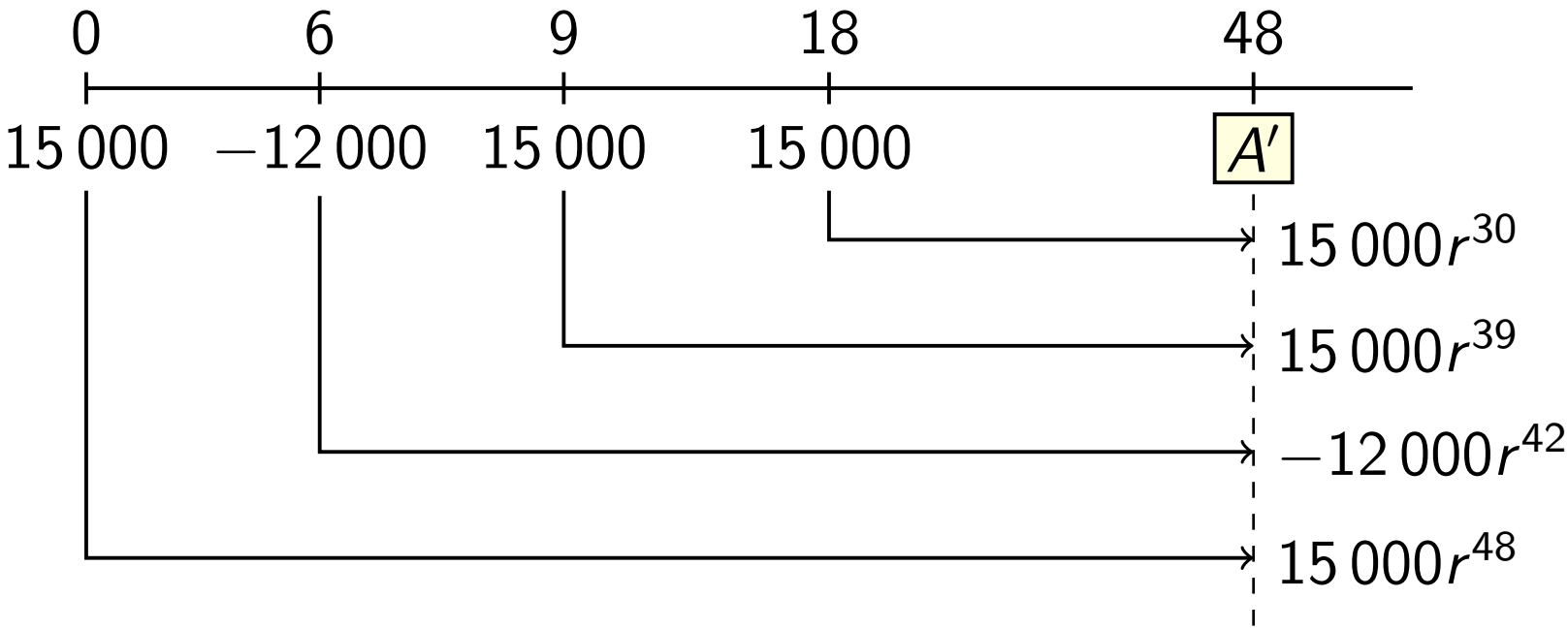

0
6
9
18
48
15 000
−12 000
15 000
15 000
A′
15 000r^30
15 000r^39
−12 000r^42
15 000r^48

Rješenje



$$A' = 15\,000r^{48} - 12\,000r^{42} + 15\,000r^{39} + 15\,000r^{30}$$

Rješenje

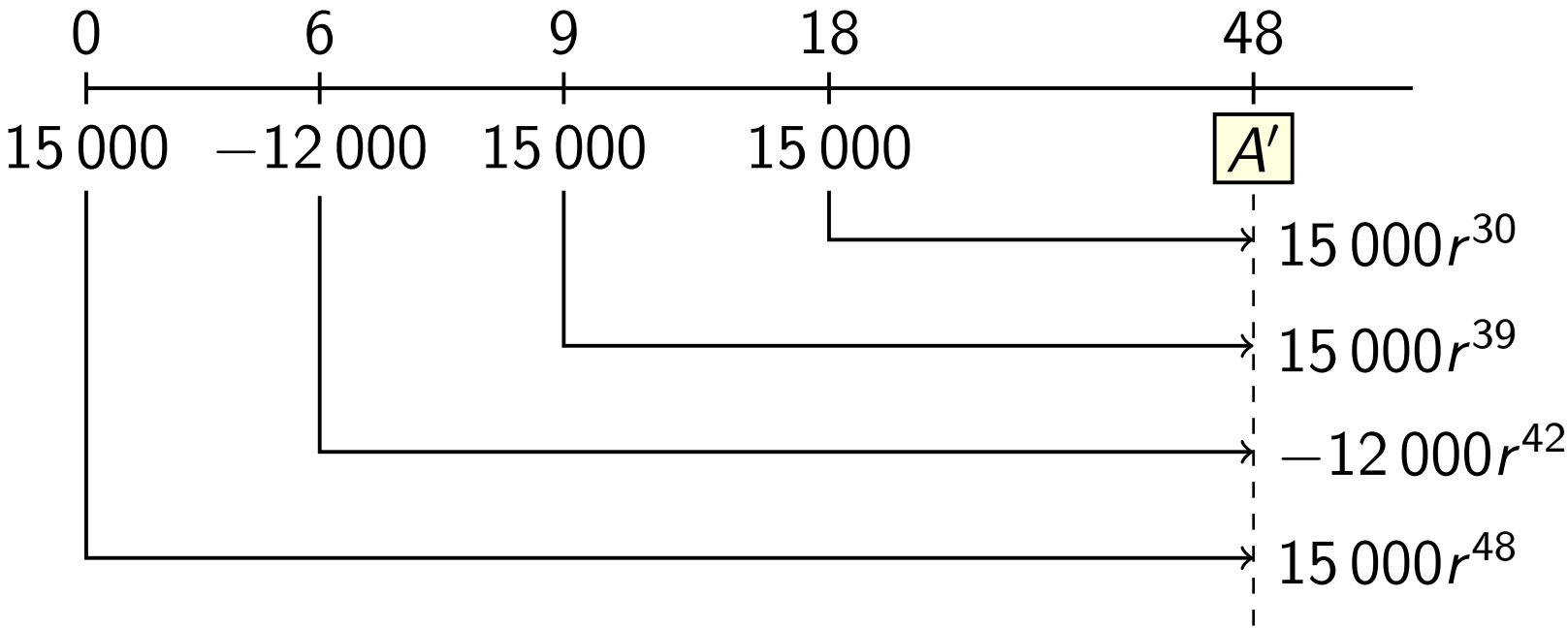


$$A' = 15\,000r^{48} - 12\,000r^{42} + 15\,000r^{39} + 15\,000r^{30}$$

$$A' = 15\,000 \cdot \sqrt[12]{1.055}^{48} - 12\,000 \cdot \sqrt[12]{1.055}^{42} +$$

$$+ 15\,000 \cdot \sqrt[12]{1.055}^{39} + 15\,000 \cdot \sqrt[12]{1.055}^{30}$$

Rješenje



$$A' = 15\,000r^{48} - 12\,000r^{42} + 15\,000r^{39} + 15\,000r^{30}$$

$$A' = 15\,000 \cdot \sqrt[12]{1.055}^{48} - 12\,000 \cdot \sqrt[12]{1.055}^{42} +$$

$$+ 15\,000 \cdot \sqrt[12]{1.055}^{39} + 15\,000 \cdot \sqrt[12]{1.055}^{30}$$

$$A' = 39\,108.48$$

$$A' = R \cdot \frac{r^n - 1}{r^n \cdot (r - 1)} \qquad n = \frac{\log \frac{R}{R - A' \cdot (r - 1)}}{\log r}$$

$$A' = R \cdot \frac{r^n - 1}{r^n \cdot (r - 1)} \qquad n = \frac{\log \frac{R}{R - A' \cdot (r - 1)}}{\log r}$$

$$n = \frac{\log \frac{3500}{3500 - 39\,108.48 \cdot \left(\sqrt[12]{1.055} - 1\right)}}{\log \sqrt[12]{1.055}}$$

$$A' = R \cdot \frac{r^n - 1}{r^n \cdot (r-1)} \qquad n = \frac{\log \frac{R}{R - A' \cdot (r-1)}}{\log r}$$

$$n = \frac{\log \frac{3500}{3500 - 39\,108.48 \cdot \left(\sqrt[12]{1.055} - 1\right)}}{\log \sqrt[12]{1.055}} = 11.48$$

$$A' = R \cdot \frac{r^n - 1}{r^n \cdot (r-1)} \qquad n = \frac{\log \dfrac{R}{R - A' \cdot (r-1)}}{\log r}$$

$$n = \frac{\log \dfrac{3500}{3500 - 39\,108.48 \cdot \left(\sqrt[12]{1.055} - 1\right)}}{\log \sqrt[12]{1.055}} = 11.48$$

Dakle, $n = 11$, tj. može se primiti 11 isplata visine 3500 kn.

$$A' = R \cdot \frac{r^n - 1}{r^n \cdot (r-1)} \qquad n = \frac{\log \dfrac{R}{R - A' \cdot (r-1)}}{\log r}$$

$$n = \frac{\log \dfrac{3500}{3500 - 39\,108.48 \cdot \left(\sqrt[12]{1.055} - 1\right)}}{\log \sqrt[12]{1.055}} = 11.48$$

Dakle, $n = 11$, tj. može se primiti 11 isplata visine 3500 kn.

Krnja isplata

$$R' = \left(A' - R \cdot \frac{r^n - 1}{r^n \cdot (r-1)}\right) \cdot r^{n+1}$$

$$A' = R \cdot \frac{r^n - 1}{r^n \cdot (r-1)} \qquad n = \frac{\log \dfrac{R}{R - A' \cdot (r-1)}}{\log r}$$

$$n = \frac{\log \dfrac{3500}{3500 - 39\,108.48 \cdot \left(\sqrt[12]{1.055} - 1\right)}}{\log \sqrt[12]{1.055}} = 11.48$$

Dakle, $n = 11$, tj. može se primiti 11 isplata visine 3500 kn.

Krnja isplata

$$R' = \left(A' - R \cdot \frac{r^n - 1}{r^n \cdot (r-1)}\right) \cdot r^{n+1}$$

$$R' = \left(39\,108.48 - 3500 \cdot \frac{\sqrt[12]{1.055}^{11} - 1}{\sqrt[12]{1.055}^{11} \cdot \left(\sqrt[12]{1.055} - 1\right)}\right) \cdot \sqrt[12]{1.055}^{11+1}$$

$$A' = R \cdot \frac{r^n - 1}{r^n \cdot (r-1)} \qquad n = \frac{\log \dfrac{R}{R - A' \cdot (r-1)}}{\log r}$$

$$n = \frac{\log \dfrac{3500}{3500 - 39\,108.48 \cdot \left(\sqrt[12]{1.055} - 1\right)}}{\log \sqrt[12]{1.055}} = 11.48$$

Dakle, $n = 11$, tj. može se primiti 11 isplata visine 3500 kn.

Krnja isplata

$$R' = \left(A' - R \cdot \frac{r^n - 1}{r^n \cdot (r-1)}\right) \cdot r^{n+1} \qquad R' = 1710.93$$

$$R' = \left(39\,108.48 - 3500 \cdot \frac{\sqrt[12]{1.055}^{11} - 1}{\sqrt[12]{1.055}^{11} \cdot \left(\sqrt[12]{1.055} - 1\right)}\right) \cdot \sqrt[12]{1.055}^{11+1}$$

peti zadatak

Zadatak 5

Ivan ima brižne roditelje i strica Stjepana. Kako bi Ivanu osigurali bezbrižno studiranje, njegovi roditelji zajedno sa stricom Stjepanom su otvorili račun u banci. Krajem svakog mjeseca tijekom četiri godine, počevši od ožujka 2007., roditelji izdvajaju 500 *kn, a stric Stjepan* 700 *kn i ukupni iznos uplaćuju na Ivanov račun. Zbog troškova upisa na fakultet, Ivan je sa svojeg računa 1. rujna 2011. godine podigao* 2000 *kn.*

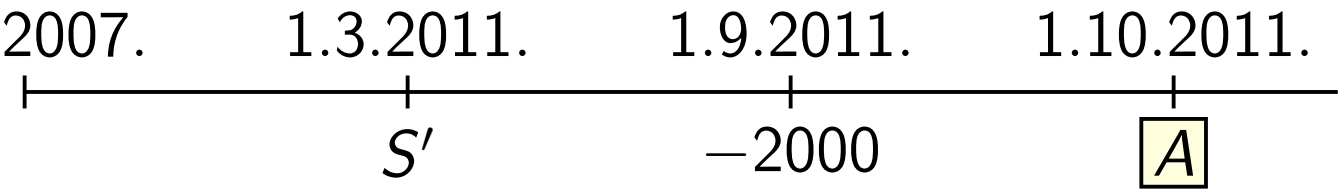
a) *Od 1. listopada 2011. Ivan želi početkom svakog mjeseca primati rentu u iznosu od* 1200 *kn. Koliko takvih isplata Ivan može primiti temeljem iznosa s kojim raspolaže na svojem računu?*

b) *Kolika je krnja isplata?*

Godišnja kamatna stopa je 6.5%.

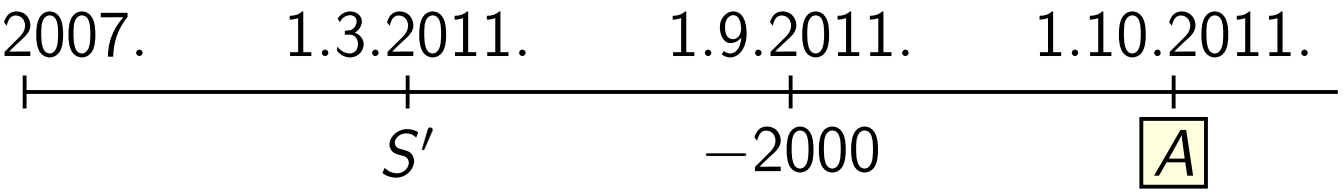
Rješenje

a)



Rješenje

a)

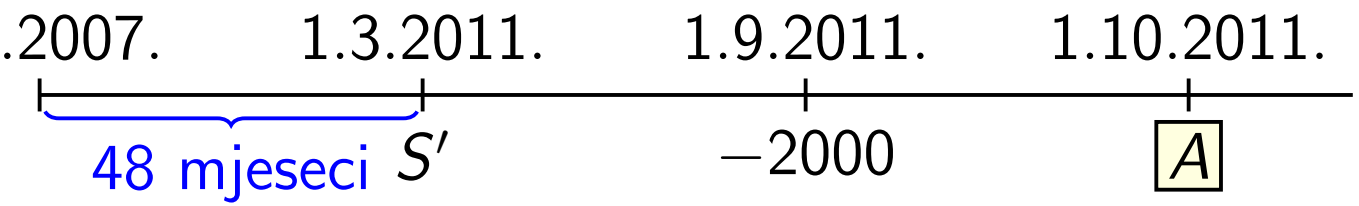


$$S' = R \cdot \frac{r^n - 1}{r - 1}$$

$$R = 500 + 700 = 1200$$

Rješenje

a)



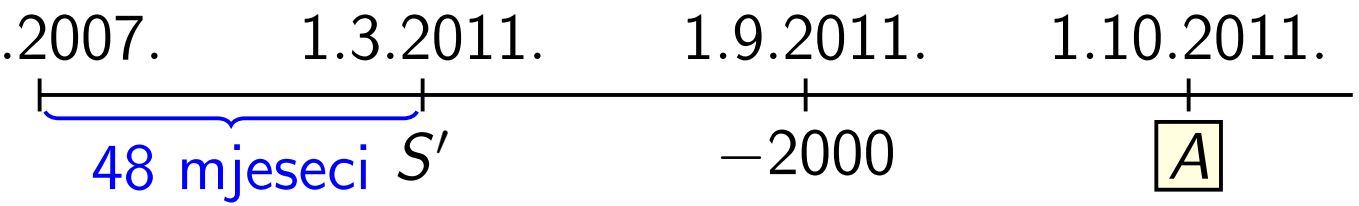
$$S' = R \cdot \frac{r^n - 1}{r - 1}$$

$$R = 500 + 700 = 1200$$

$$S' = 1200 \cdot \frac{\sqrt[12]{1.065}^{48} - 1}{\sqrt[12]{1.065} - 1}$$

Rješenje

a)



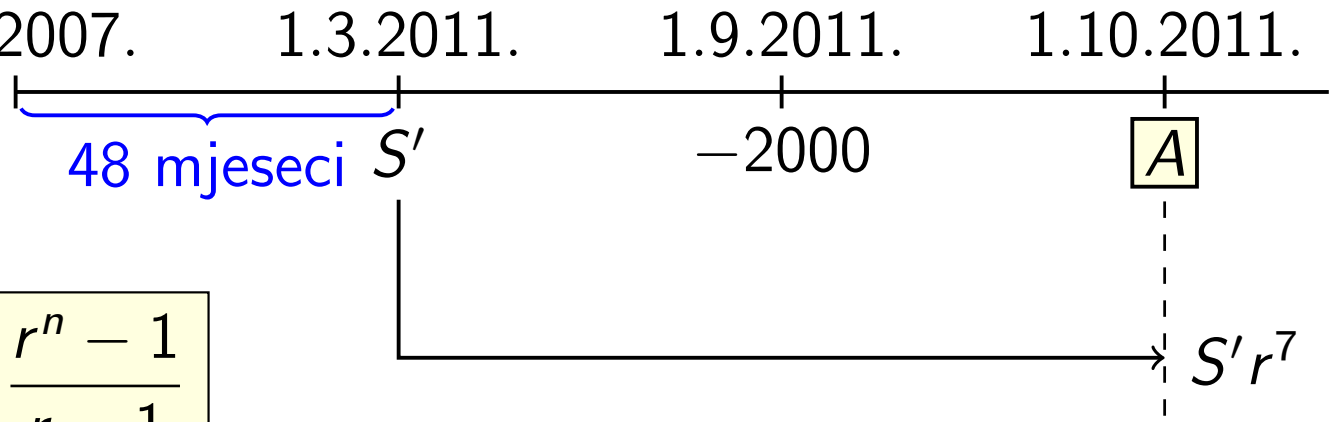
$$S' = R \cdot \frac{r^n - 1}{r - 1}$$

$$R = 500 + 700 = 1200$$

$$S' = 1200 \cdot \frac{\sqrt[12]{1.065}^{48} - 1}{\sqrt[12]{1.065} - 1} = 65\,332.50$$

Rješenje

a)



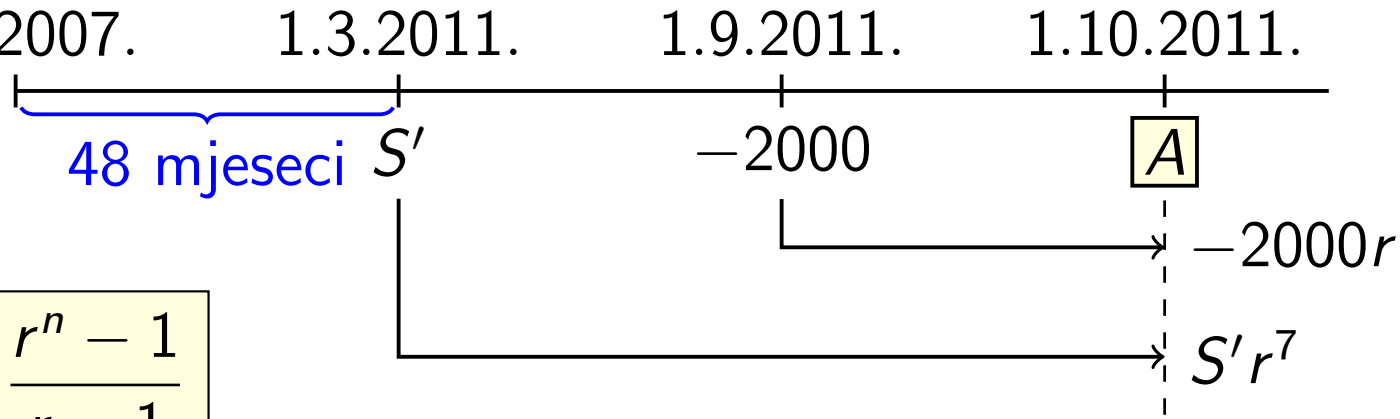
$$S' = R \cdot \frac{r^n - 1}{r - 1}$$

$$R = 500 + 700 = 1200$$

$$S' = 1200 \cdot \frac{\sqrt[12]{1.065}^{48} - 1}{\sqrt[12]{1.065} - 1} = 65\,332.50$$

Rješenje

a)



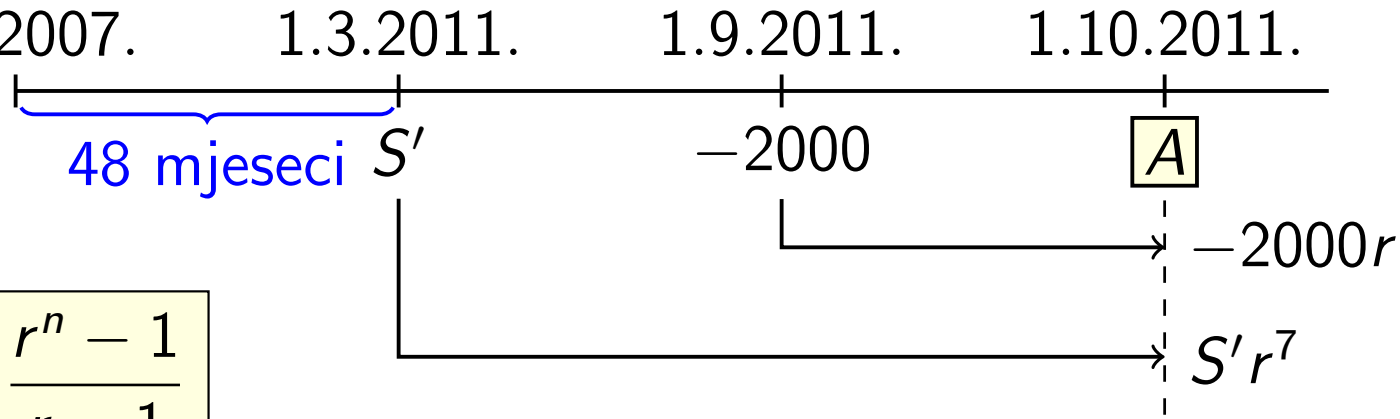
$$S' = R \cdot \frac{r^n - 1}{r - 1}$$

$$R = 500 + 700 = 1200$$

$$S' = 1200 \cdot \frac{\sqrt[12]{1.065}^{48} - 1}{\sqrt[12]{1.065} - 1} = 65\,332.50$$

Rješenje

a)



$$S' = R \cdot \frac{r^n - 1}{r - 1}$$

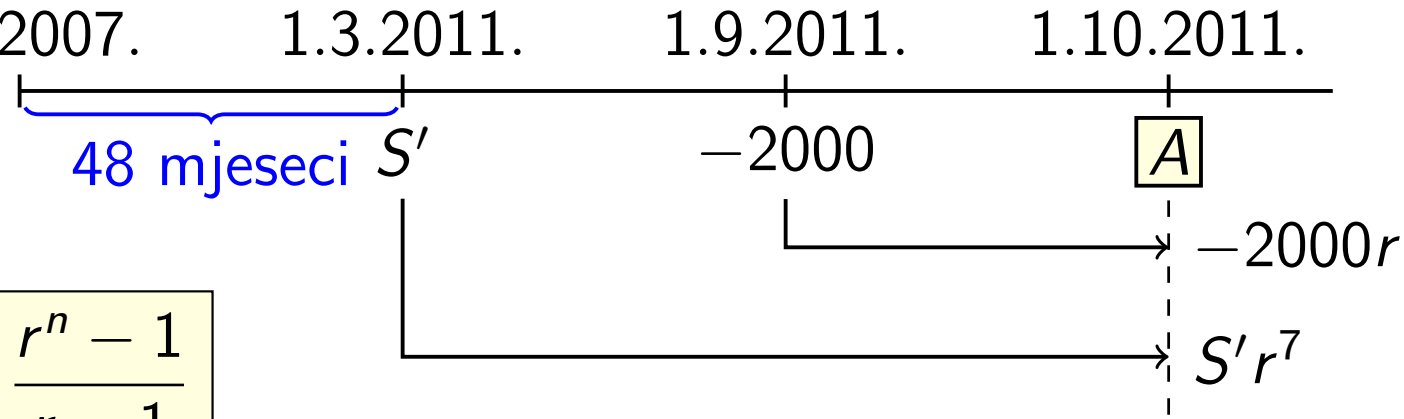
$$R = 500 + 700 = 1200$$

$$S' = 1200 \cdot \frac{\sqrt[12]{1.065}^{48} - 1}{\sqrt[12]{1.065} - 1} = 65\,332.50$$

$$A = S'r^7 - 2000r$$

Rješenje

a)



$$S' = R \cdot \frac{r^n - 1}{r - 1}$$

$$R = 500 + 700 = 1200$$

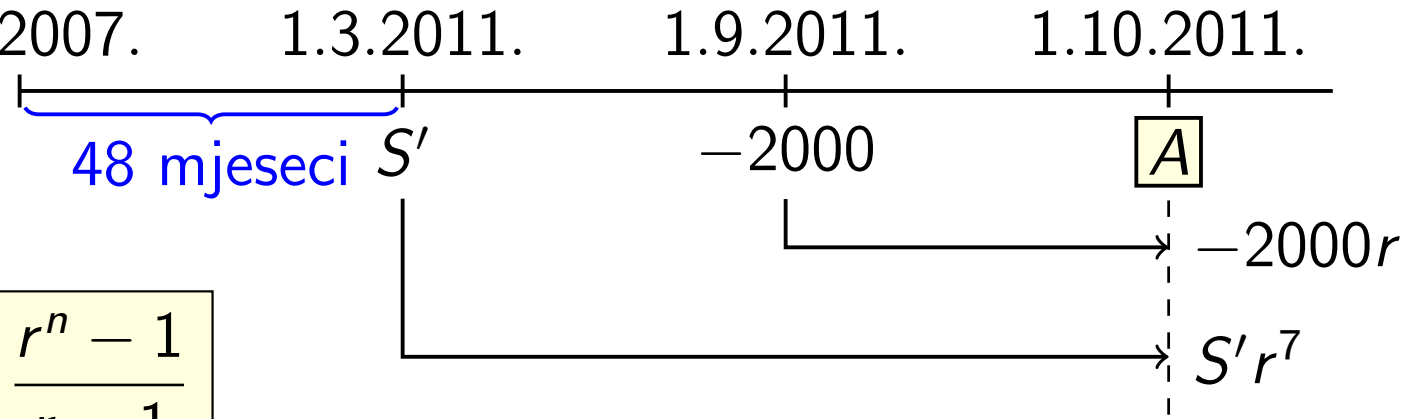
$$S' = 1200 \cdot \frac{\sqrt[12]{1.065}^{48} - 1}{\sqrt[12]{1.065} - 1} = 65\,332.50$$

$$A = S'r^7 - 2000r$$

$$A = 65\,332.50 \cdot \sqrt[12]{1.065}^{7} - 2000 \cdot \sqrt[12]{1.065}$$

Rješenje

a)



$$S' = R \cdot \frac{r^n - 1}{r - 1}$$

$$R = 500 + 700 = 1200$$

$$S' = 1200 \cdot \frac{\sqrt[12]{1.065}^{48} - 1}{\sqrt[12]{1.065} - 1} = 65\,332.50$$

$$A = S'r^7 - 2000r$$

$$A = 65\,332.50 \cdot \sqrt[12]{1.065}^{7} - 2000 \cdot \sqrt[12]{1.065}$$

$$A = 65\,766.61$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)} \qquad n = \frac{\log \frac{R \cdot r}{R \cdot r - A \cdot (r-1)}}{\log r}$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)} \qquad n = \frac{\log \dfrac{R \cdot r}{R \cdot r - A \cdot (r-1)}}{\log r}$$

$$n = \frac{\log \dfrac{1200 \cdot \sqrt[12]{1.065}}{1200 \cdot \sqrt[12]{1.065} - 65\,766.61 \cdot \left(\sqrt[12]{1.065} - 1\right)}}{\log \sqrt[12]{1.065}}$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)} \qquad n = \frac{\log \frac{R \cdot r}{R \cdot r - A \cdot (r-1)}}{\log r}$$

$$n = \frac{\log \frac{1200 \cdot \sqrt[12]{1.065}}{1200 \cdot \sqrt[12]{1.065} - 65\,766.61 \cdot \left(\sqrt[12]{1.065} - 1\right)}}{\log \sqrt[12]{1.065}} = 64.42$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)} \qquad n = \frac{\log \dfrac{R \cdot r}{R \cdot r - A \cdot (r-1)}}{\log r}$$

$$n = \frac{\log \dfrac{1200 \cdot \sqrt[12]{1.065}}{1200 \cdot \sqrt[12]{1.065} - 65\,766.61 \cdot \left(\sqrt[12]{1.065} - 1\right)}}{\log \sqrt[12]{1.065}} = 64.42$$

Dakle, $n = 64$, tj. Ivan može primiti 64 isplate visine 1200 kn.

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)} \qquad n = \frac{\log \dfrac{R \cdot r}{R \cdot r - A \cdot (r-1)}}{\log r}$$

$$n = \frac{\log \dfrac{1200 \cdot \sqrt[12]{1.065}}{1200 \cdot \sqrt[12]{1.065} - 65\,766.61 \cdot \left(\sqrt[12]{1.065} - 1\right)}}{\log \sqrt[12]{1.065}} = 64.42$$

Dakle, $n = 64$, tj. Ivan može primiti 64 isplate visine 1200 kn.

b) **Krnja isplata**

$$R' = \left(A - R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)}\right) \cdot r^n$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)} \qquad n = \frac{\log \dfrac{R \cdot r}{R \cdot r - A \cdot (r-1)}}{\log r}$$

$$n = \frac{\log \dfrac{1200 \cdot \sqrt[12]{1.065}}{1200 \cdot \sqrt[12]{1.065} - 65\,766.61 \cdot \left(\sqrt[12]{1.065} - 1\right)}}{\log \sqrt[12]{1.065}} = 64.42$$

Dakle, $n = 64$, tj. Ivan može primiti 64 isplate visine 1200 kn.

b) **Krnja isplata**

$$R' = \left(A - R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)}\right) \cdot r^n$$

$$R' = \left(65\,766.61 - 1200 \cdot \frac{\sqrt[12]{1.065}^{64} - 1}{\sqrt[12]{1.065}^{64-1} \cdot \left(\sqrt[12]{1.065} - 1\right)}\right) \cdot \sqrt[12]{1.065}^{64}$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)} \qquad n = \frac{\log \dfrac{R \cdot r}{R \cdot r - A \cdot (r-1)}}{\log r}$$

$$n = \frac{\log \dfrac{1200 \cdot \sqrt[12]{1.065}}{1200 \cdot \sqrt[12]{1.065} - 65\,766.61 \cdot \left(\sqrt[12]{1.065} - 1\right)}}{\log \sqrt[12]{1.065}} = 64.42$$

Dakle, $n = 64$, tj. Ivan može primiti 64 isplate visine 1200 kn.

b) **Krnja isplata**

$$R' = \left(A - R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)}\right) \cdot r^n \qquad R' = 506.70$$

$$R' = \left(65\,766.61 - 1200 \cdot \frac{\sqrt[12]{1.065}^{64} - 1}{\sqrt[12]{1.065}^{64-1} \cdot \left(\sqrt[12]{1.065} - 1\right)}\right) \cdot \sqrt[12]{1.065}^{64}$$

šesti zadatak

Zadatak 6

Tomislav je uložio u banku 4000 €.

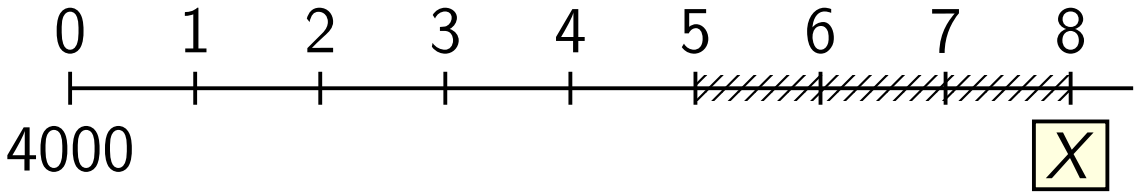
a) *Kolikim će iznosom raspolagati na kraju osme godine ako u posljednje tri godine bude podizao iz banke po* 500 € *početkom svakog kvartala?*

b) *Ukoliko od kraja desete godine od raspoloživog iznosa Tomislav želi primati prenumerando mjesečne isplate visine* 300 €, *koliko takvih isplata može primiti i kolika je krnja isplata?*

Polugodišnja kamatna stopa je 5.1%.

Rješenje

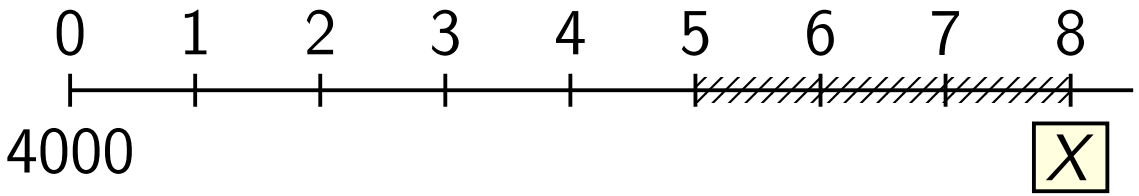
a) Prvi način: preko prenumerando isplata



Rješenje

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r - 1)}$$

a) Prvi način: preko prenumerando isplata



kvartalni dekurzivni kamatni faktor

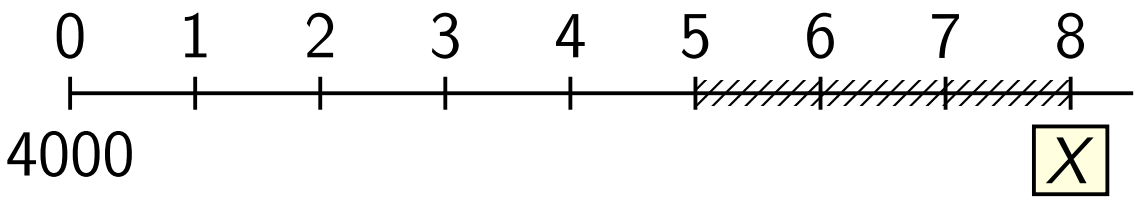
$$r_1 = \sqrt{1.051}$$

$$Y = R \cdot \frac{r_1^n - 1}{r_1^{n-1} \cdot (r_1 - 1)}$$

Rješenje

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r - 1)}$$

a) Prvi način: preko prenumerando isplata



kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

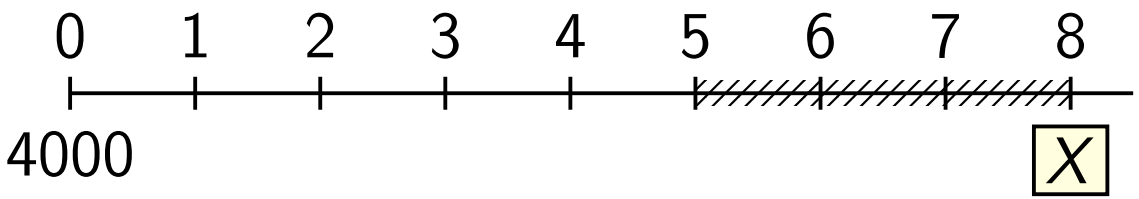
$$Y = R \cdot \frac{r_1^n - 1}{r_1^{n-1} \cdot (r_1 - 1)}$$

$$Y = 500 \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051}^{12-1} \cdot \left(\sqrt{1.051} - 1\right)}$$

Rješenje

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r - 1)}$$

a) Prvi način: preko prenumerando isplata



kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

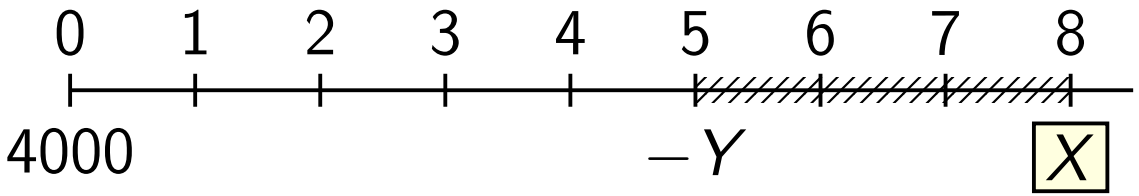
$$Y = R \cdot \frac{r_1^n - 1}{r_1^{n-1} \cdot (r_1 - 1)}$$

$$Y = 500 \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051}^{12-1} \cdot \left(\sqrt{1.051} - 1\right)} = 5252.22$$

Rješenje

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)}$$

a) Prvi način: preko prenumerando isplata



kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

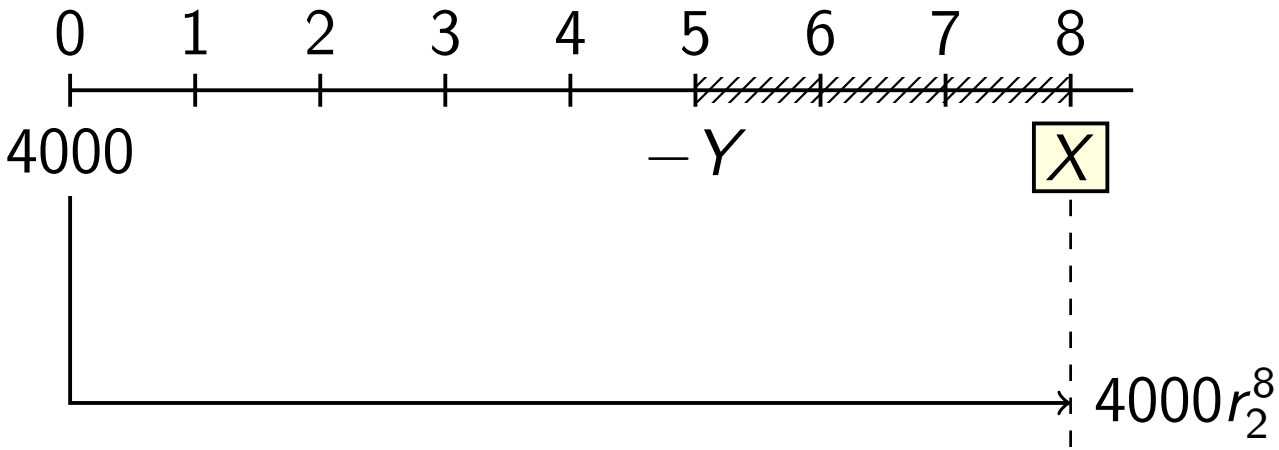
$$Y = R \cdot \frac{r_1^n - 1}{r_1^{n-1} \cdot (r_1 - 1)}$$

$$Y = 500 \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051}^{12-1} \cdot \left(\sqrt{1.051} - 1\right)} = 5252.22$$

Rješenje

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r - 1)}$$

a) Prvi način: preko prenumerando isplata



kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

godišnji dekurzivni kamatni faktor

$$r_2 = 1.051^2$$

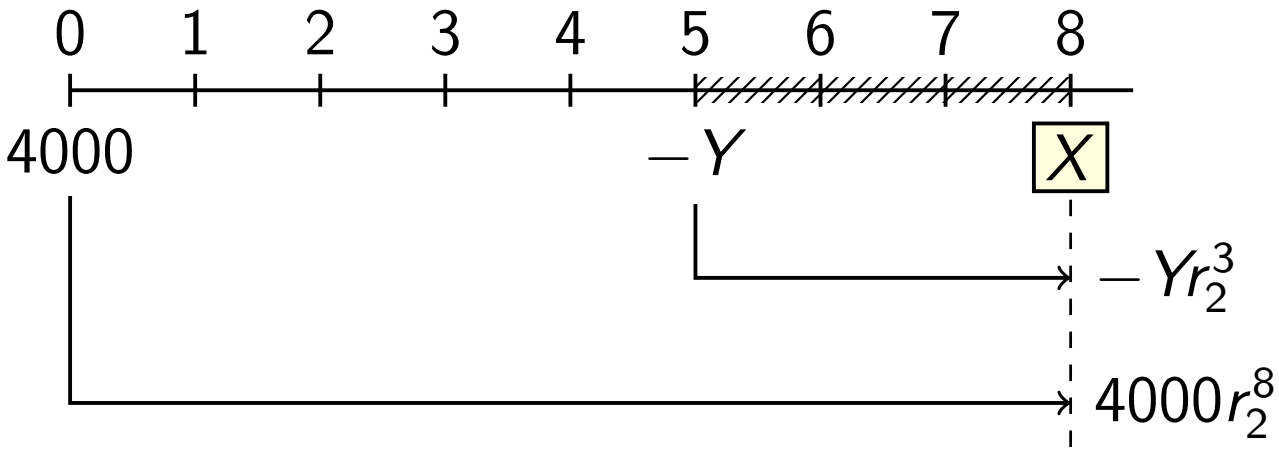
$$Y = R \cdot \frac{r_1^n - 1}{r_1^{n-1} \cdot (r_1 - 1)}$$

$$Y = 500 \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051}^{12-1} \cdot \left(\sqrt{1.051} - 1\right)} = 5252.22$$

Rješenje

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r - 1)}$$

a) Prvi način: preko prenumerando isplata



kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

godišnji dekurzivni kamatni faktor

$$r_2 = 1.051^2$$

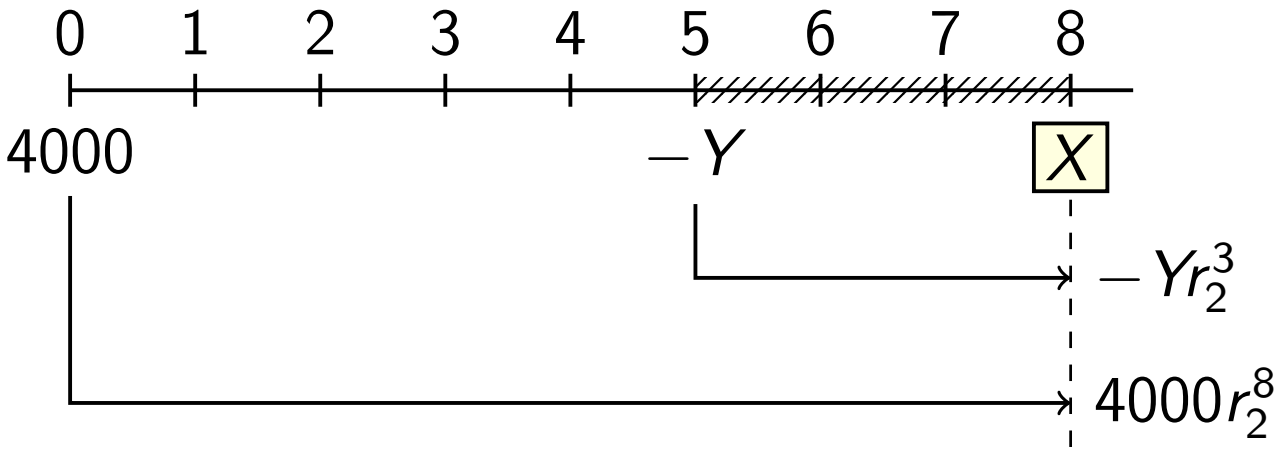
$$Y = R \cdot \frac{r_1^n - 1}{r_1^{n-1} \cdot (r_1 - 1)}$$

$$Y = 500 \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051}^{12-1} \cdot \left(\sqrt{1.051} - 1\right)} = 5252.22$$

Rješenje

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r - 1)}$$

a) Prvi način: preko prenumerando isplata



kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

godišnji dekurzivni kamatni faktor

$$r_2 = 1.051^2$$

$$Y = R \cdot \frac{r_1^n - 1}{r_1^{n-1} \cdot (r_1 - 1)}$$

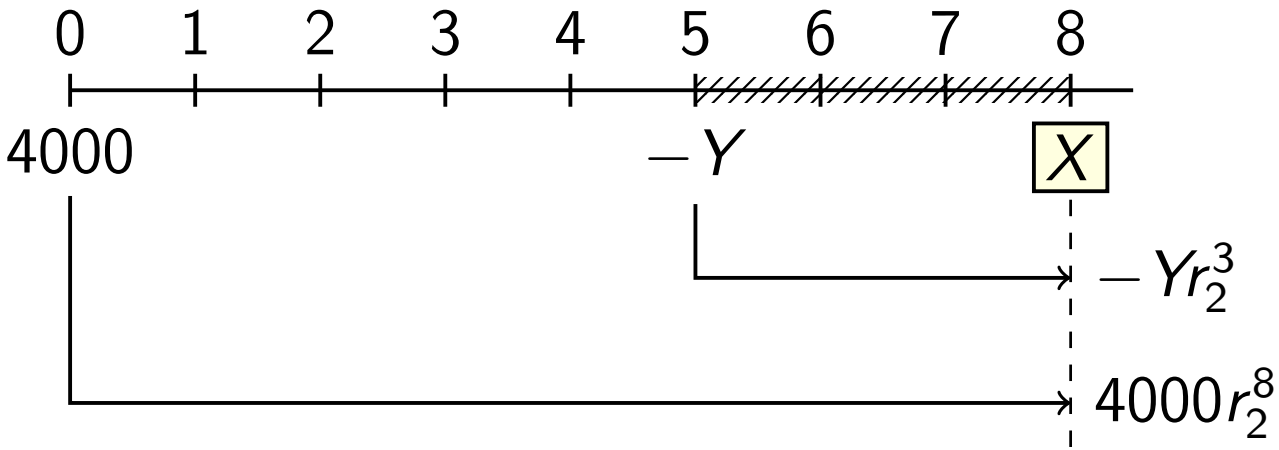
$$Y = 500 \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051}^{12-1} \cdot \left(\sqrt{1.051} - 1\right)} = 5252.22$$

$$X = 4000 r_2^8 - Y r_2^3$$

Rješenje

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)}$$

a) Prvi način: preko prenumerando isplata



kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

godišnji dekurzivni kamatni faktor

$$r_2 = 1.051^2$$

$$Y = R \cdot \frac{r_1^n - 1}{r_1^{n-1} \cdot (r_1 - 1)}$$

$$Y = 500 \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051}^{12-1} \cdot \left(\sqrt{1.051} - 1\right)} = 5252.22$$

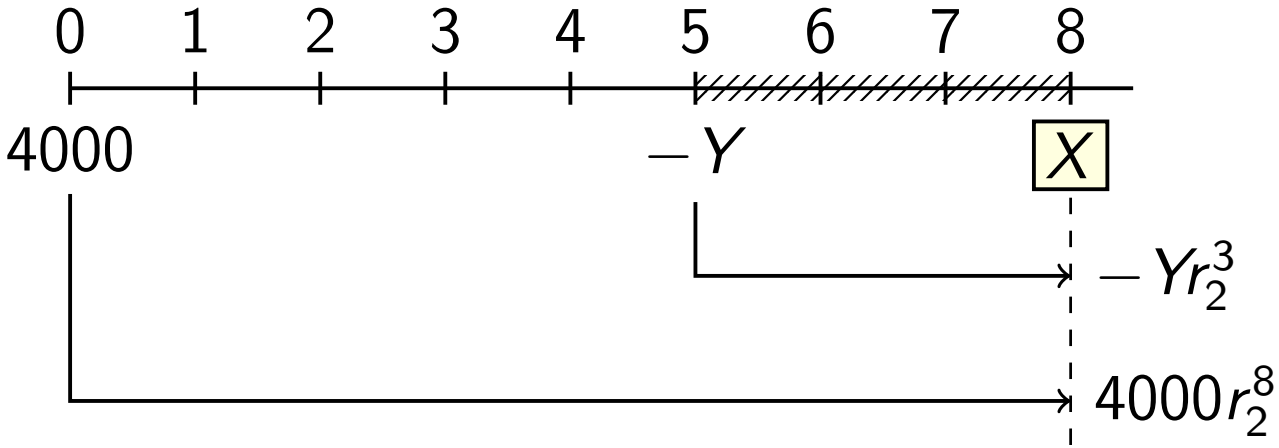
$$X = 4000 r_2^8 - Y r_2^3$$

$$X = 4000 \cdot \left(1.051^2\right)^8 - 5252.22 \cdot \left(1.051^2\right)^3$$

Rješenje

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r - 1)}$$

a) Prvi način: preko prenumerando isplata



kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

godišnji dekurzivni kamatni faktor

$$r_2 = 1.051^2$$

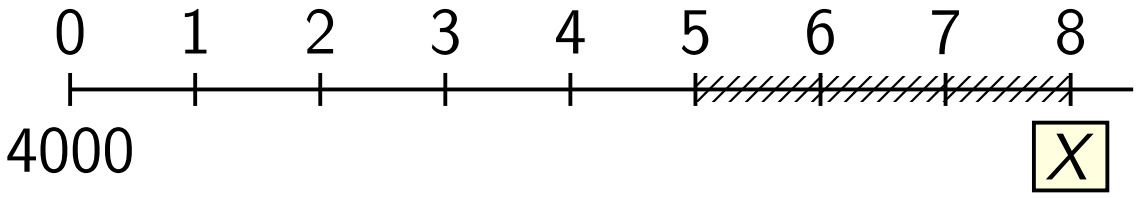
$$Y = R \cdot \frac{r_1^n - 1}{r_1^{n-1} \cdot (r_1 - 1)}$$

$$Y = 500 \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051}^{12-1} \cdot \left(\sqrt{1.051} - 1\right)} = 5252.22$$

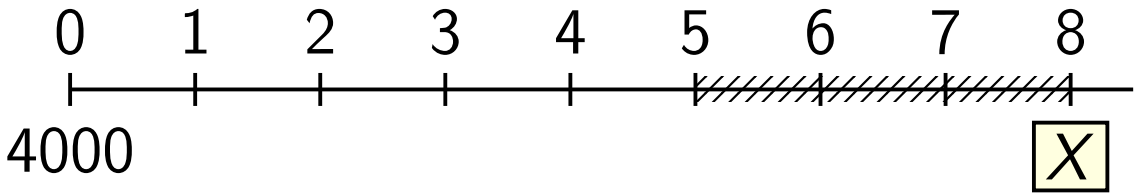
$$X = 4000 r_2^8 - Y r_2^3$$

$$X = 4000 \cdot \left(1.051^2\right)^8 - 5252.22 \cdot \left(1.051^2\right)^3 = 1786.71$$

a) Drugi način: preko prenumerando uplata



a) Drugi način: preko prenumerando uplata



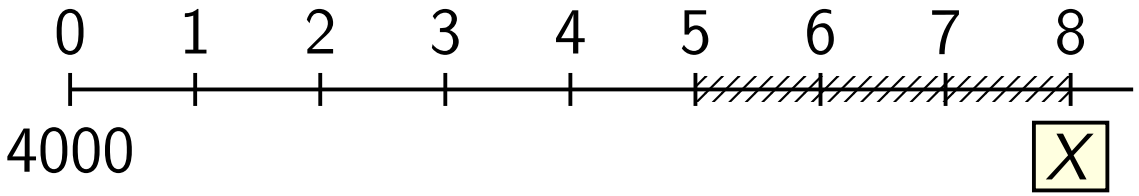
$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$

kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

$$S = R \cdot r_1 \cdot \frac{r_1^n - 1}{r_1 - 1}$$

a) Drugi način: preko prenumerando uplata



$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$

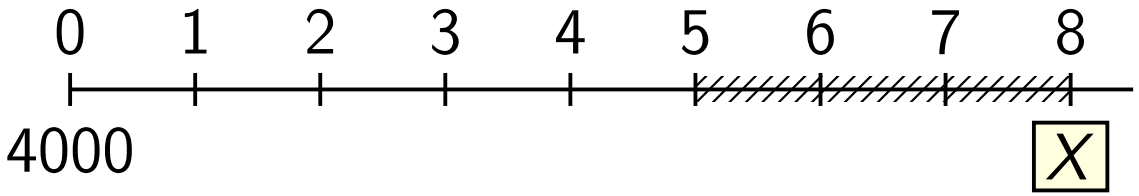
kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

$$S = R \cdot r_1 \cdot \frac{r_1^n - 1}{r_1 - 1}$$

$$S = 500 \cdot \sqrt{1.051} \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051} - 1}$$

a) Drugi način: preko prenumerando uplata



$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$

kvartalni dekurzivni kamatni faktor

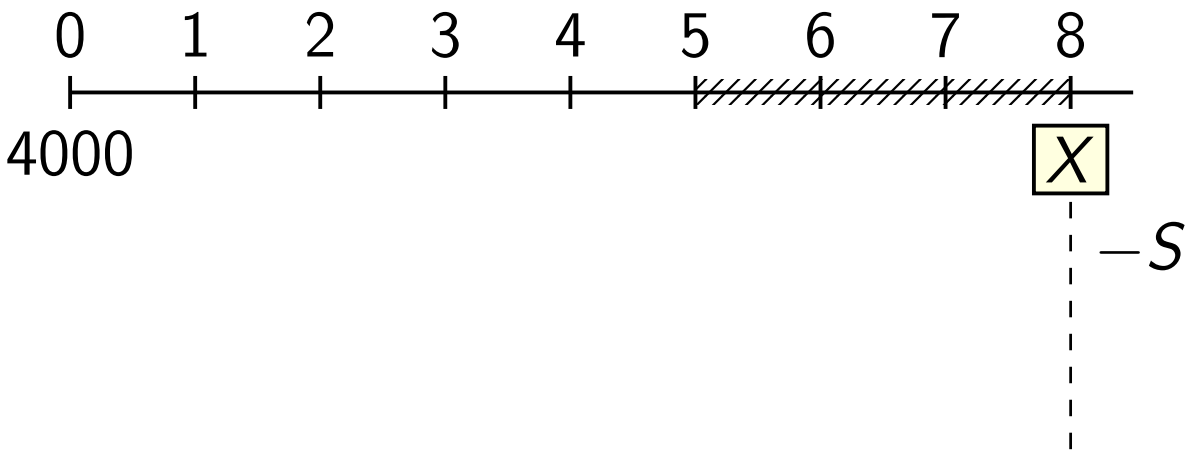
$$r_1 = \sqrt{1.051}$$

$$S = R \cdot r_1 \cdot \frac{r_1^n - 1}{r_1 - 1}$$

$$S = 500 \cdot \sqrt{1.051} \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051} - 1} = 7078.798$$

a) Drugi način: preko prenumerando uplata

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$



kvartalni dekurzivni kamatni faktor

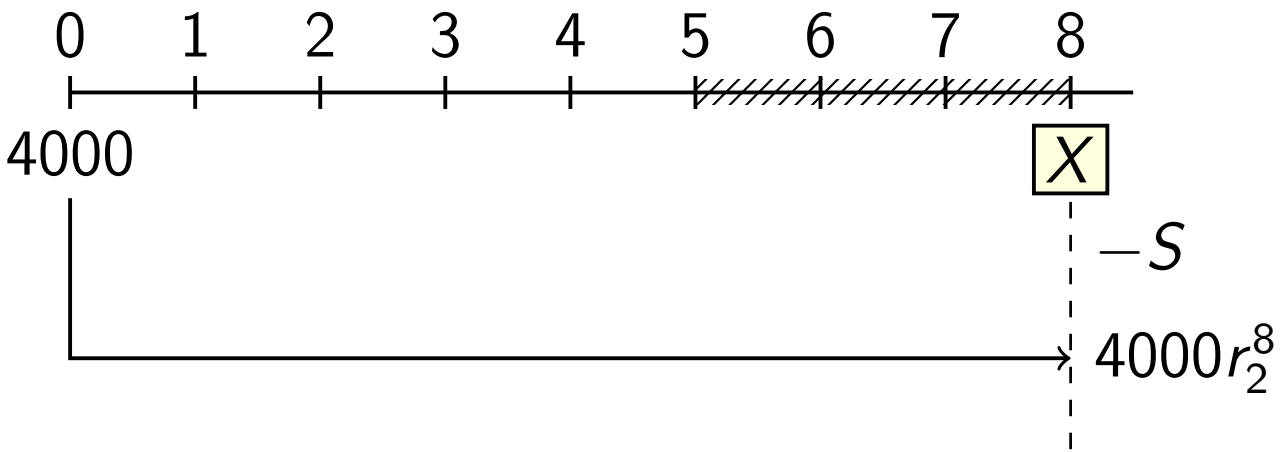
$$r_1 = \sqrt{1.051}$$

$$S = R \cdot r_1 \cdot \frac{r_1^n - 1}{r_1 - 1}$$

$$S = 500 \cdot \sqrt{1.051} \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051} - 1} = 7078.798$$

a) Drugi način: preko prenumerando uplata

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$



kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

godišnji dekurzivni kamatni faktor

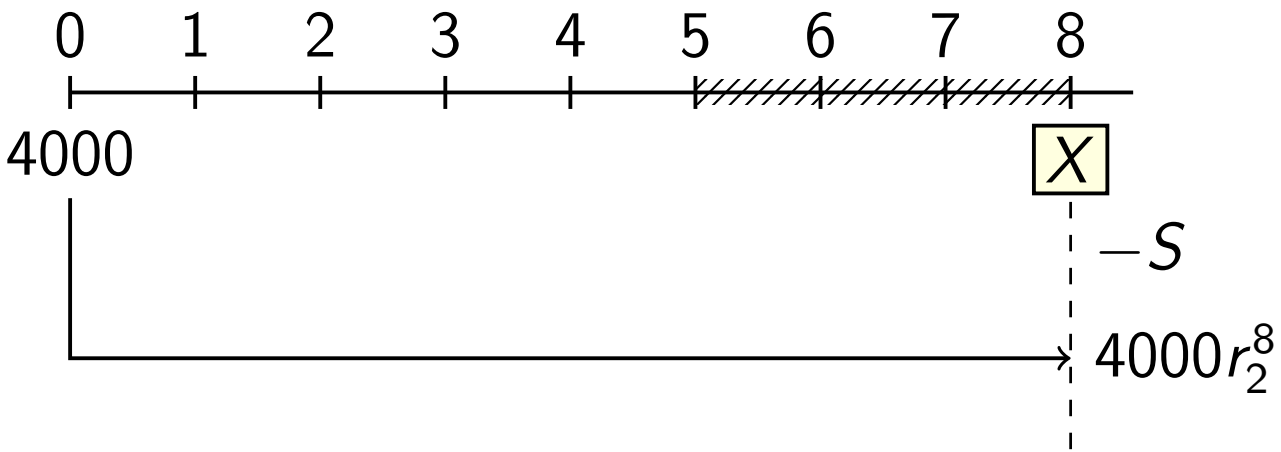
$$r_2 = 1.051^2$$

$$S = R \cdot r_1 \cdot \frac{r_1^n - 1}{r_1 - 1}$$

$$S = 500 \cdot \sqrt{1.051} \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051} - 1} = 7078.798$$

a) Drugi način: preko prenumerando uplata

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$



kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

godišnji dekurzivni kamatni faktor

$$r_2 = 1.051^2$$

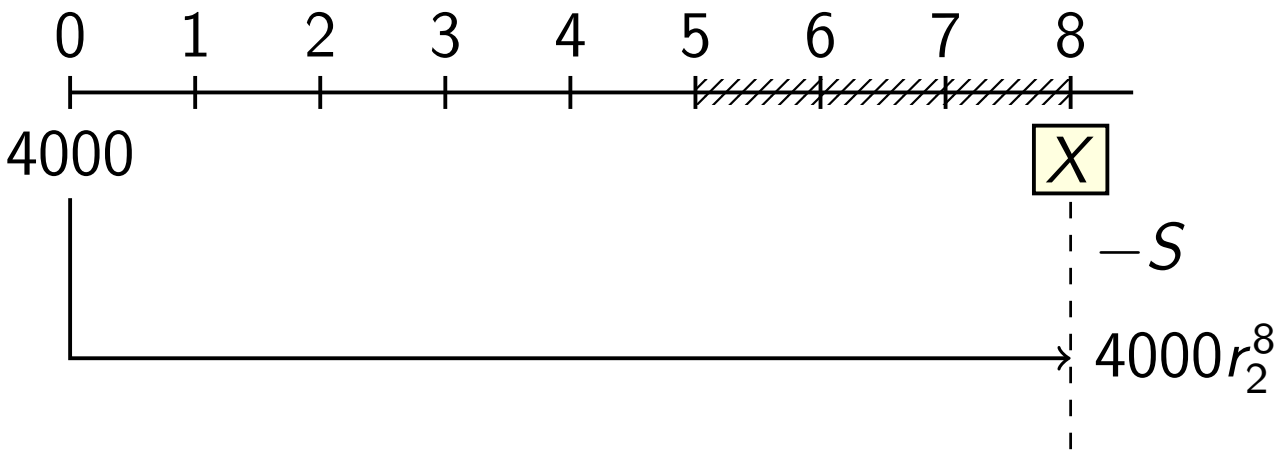
$$S = R \cdot r_1 \cdot \frac{r_1^n - 1}{r_1 - 1}$$

$$S = 500 \cdot \sqrt{1.051} \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051} - 1} = 7078.798$$

$$X = 4000 r_2^8 - S$$

a) Drugi način: preko prenumerando uplata

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$



kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

godišnji dekurzivni kamatni faktor

$$r_2 = 1.051^2$$

$$S = R \cdot r_1 \cdot \frac{r_1^n - 1}{r_1 - 1}$$

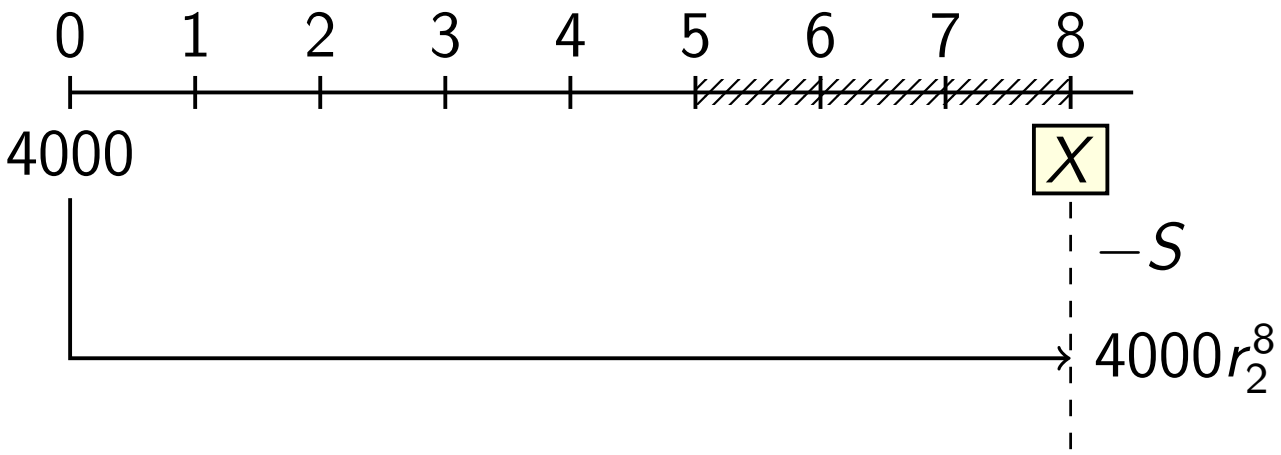
$$S = 500 \cdot \sqrt{1.051} \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051} - 1} = 7078.798$$

$$X = 4000 r_2^8 - S$$

$$X = 4000 \cdot \left(1.051^2\right)^8 - 7078.798$$

a) Drugi način: preko prenumerando uplata

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$



kvartalni dekurzivni kamatni faktor

$$r_1 = \sqrt{1.051}$$

godišnji dekurzivni kamatni faktor

$$r_2 = 1.051^2$$

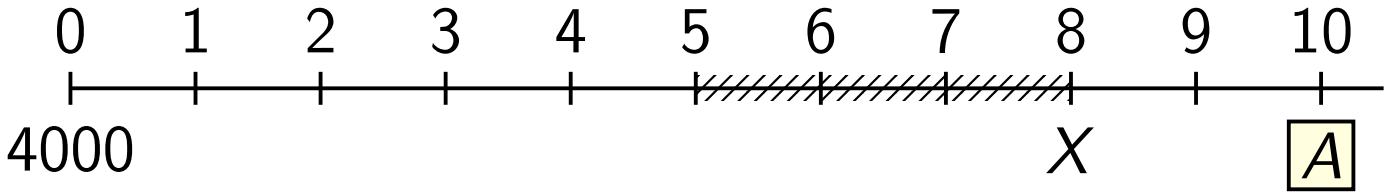
$$S = R \cdot r_1 \cdot \frac{r_1^n - 1}{r_1 - 1}$$

$$S = 500 \cdot \sqrt{1.051} \cdot \frac{\sqrt{1.051}^{12} - 1}{\sqrt{1.051} - 1} = 7078.798$$

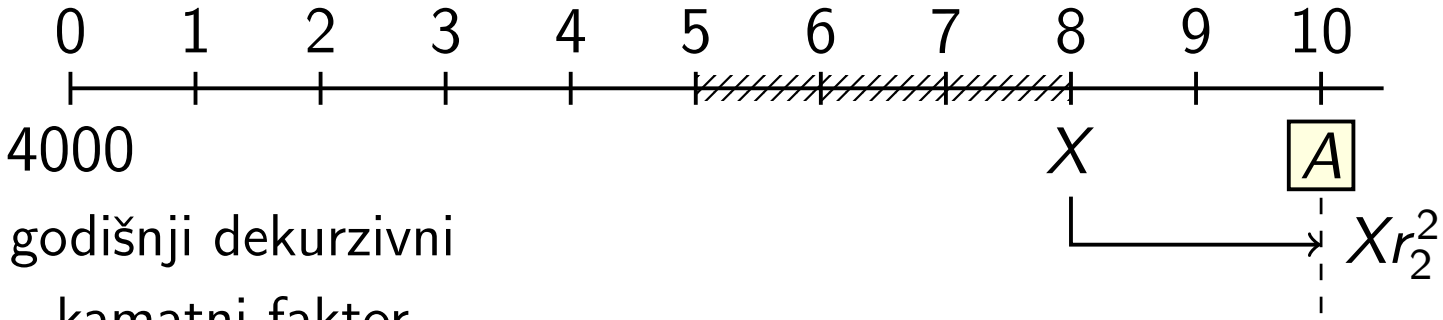
$$X = 4000 r_2^8 - S$$

$$X = 4000 \cdot \left(1.051^2\right)^8 - 7078.798 = 1786.71$$

b)



b)

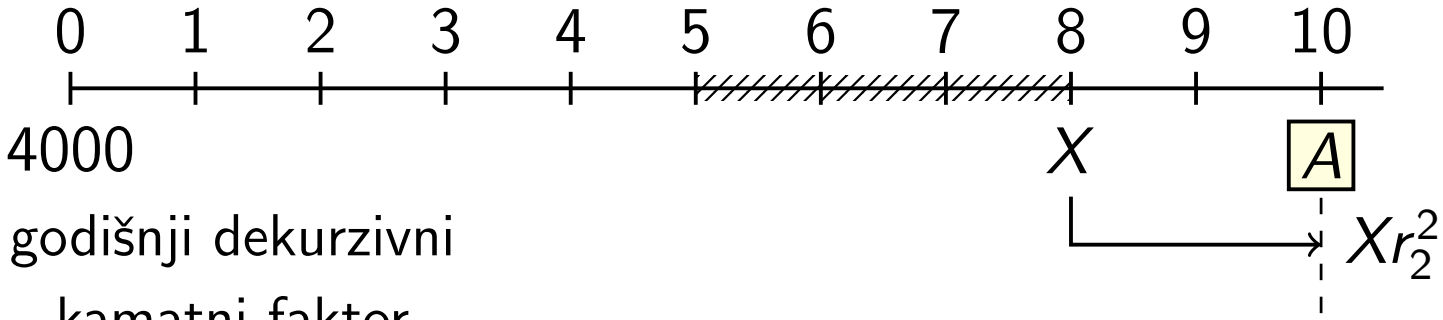


godišnji dekurzivni kamatni faktor

$$\boxed{r_2 = 1.051^2}$$

$$A = Xr_2^2$$

b)

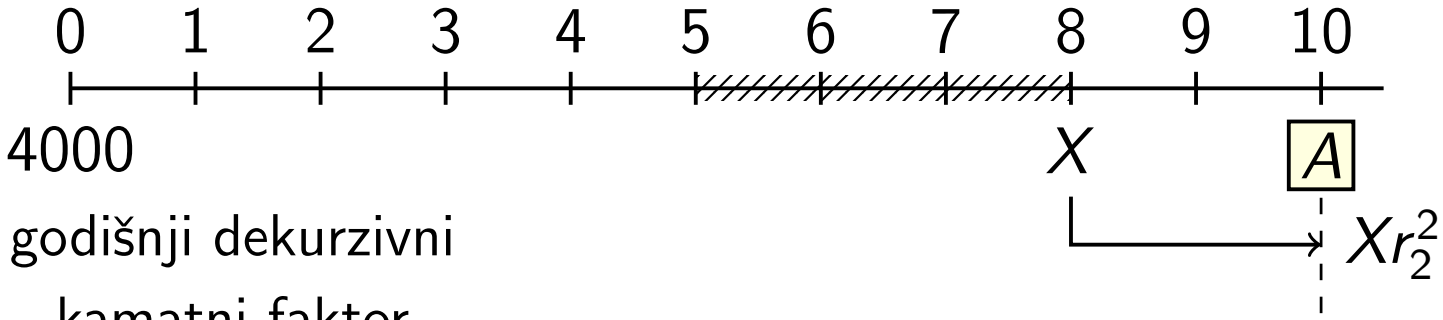


godišnji dekurzivni kamatni faktor

$$\boxed{r_2 = 1.051^2}$$

$$A = Xr_2^2 = 1786.71 \cdot \left(1.051^2\right)^2$$

b)

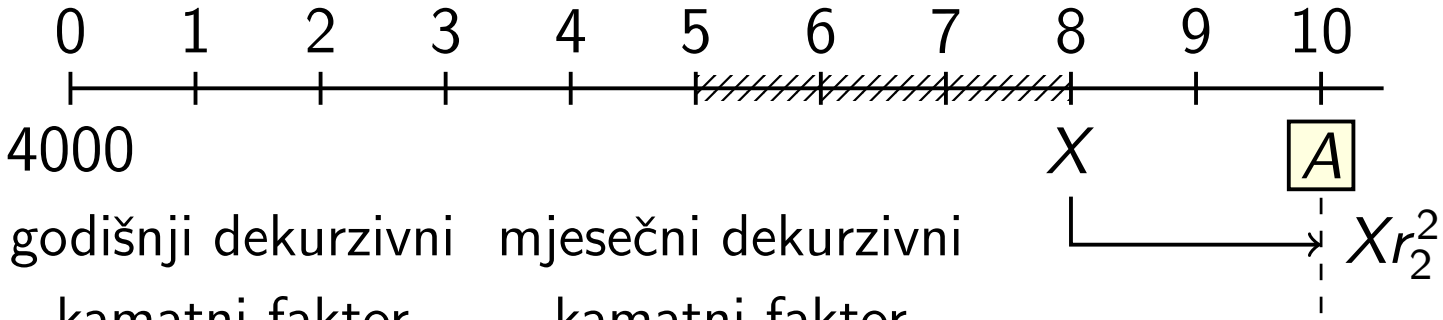


godišnji dekurzivni kamatni faktor

$$\boxed{r_2 = 1.051^2}$$

$$A = Xr_2^2 = 1786.71 \cdot \left(1.051^2\right)^2 = 2180.04$$

b)



godišnji dekurzivni kamatni faktor

$$r_2 = 1.051^2$$

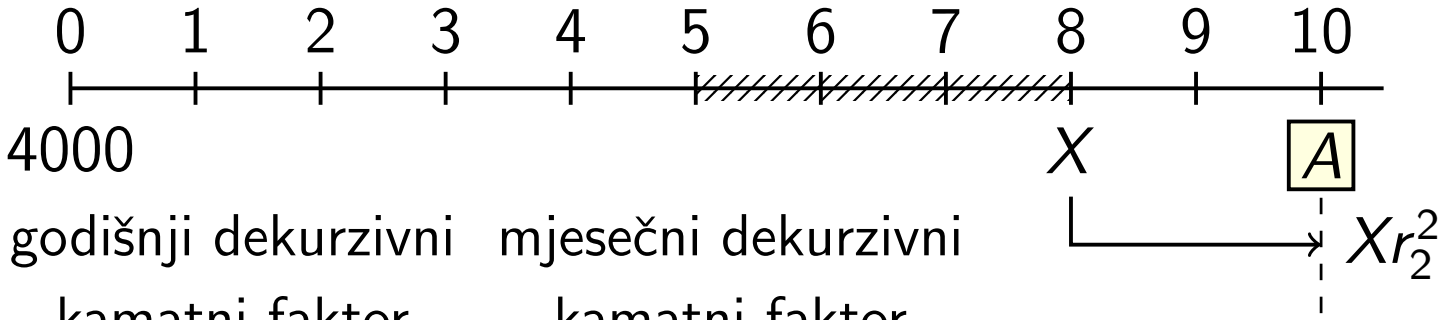
mjesečni dekurzivni kamatni faktor

$$r_3 = \sqrt[6]{1.051}$$

$$A = Xr_2^2 = 1786.71 \cdot \left(1.051^2\right)^2 = 2180.04$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)} \qquad n = \frac{\log \frac{R \cdot r_3}{R \cdot r_3 - A \cdot (r_3 - 1)}}{\log r_3}$$

b)



godišnji dekurzivni kamatni faktor

$$r_2 = 1.051^2$$

mjesečni dekurzivni kamatni faktor

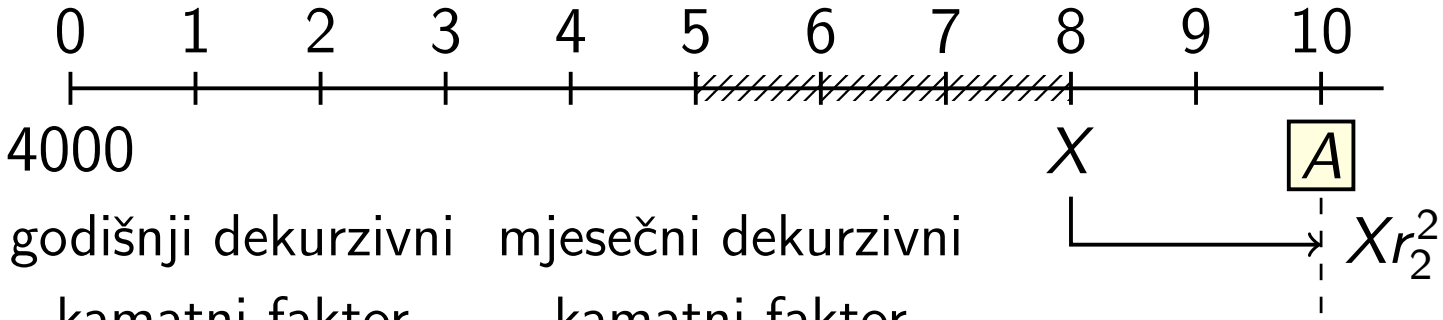
$$r_3 = \sqrt[6]{1.051}$$

$$A = Xr_2^2 = 1786.71 \cdot \left(1.051^2\right)^2 = 2180.04$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)} \qquad n = \frac{\log \frac{R \cdot r_3}{R \cdot r_3 - A \cdot (r_3 - 1)}}{\log r_3}$$

$$n = \frac{\log \frac{300 \cdot \sqrt[6]{1.051}}{300 \cdot \sqrt[6]{1.051} - 2180.04 \cdot \left(\sqrt[6]{1.051} - 1\right)}}{\log \sqrt[6]{1.051}}$$

b)



godišnji dekurzivni kamatni faktor

$$r_2 = 1.051^2$$

mjesečni dekurzivni kamatni faktor

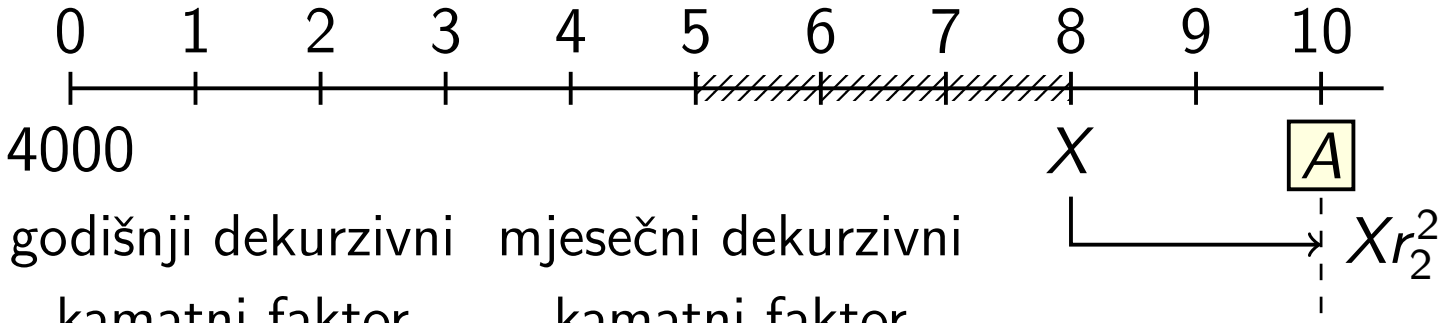
$$r_3 = \sqrt[6]{1.051}$$

$$A = Xr_2^2 = 1786.71 \cdot \left(1.051^2\right)^2 = 2180.04$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)} \qquad n = \frac{\log \frac{R \cdot r_3}{R \cdot r_3 - A \cdot (r_3 - 1)}}{\log r_3}$$

$$n = \frac{\log \frac{300 \cdot \sqrt[6]{1.051}}{300 \cdot \sqrt[6]{1.051} - 2180.04 \cdot \left(\sqrt[6]{1.051} - 1\right)}}{\log \sqrt[6]{1.051}} = 7.46$$

b)



$$\boxed{r_2 = 1.051^2} \qquad \boxed{r_3 = \sqrt[6]{1.051}}$$

$$A = Xr_2^2 = 1786.71 \cdot \left(1.051^2\right)^2 = 2180.04$$

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)} \qquad n = \frac{\log \dfrac{R \cdot r_3}{R \cdot r_3 - A \cdot (r_3 - 1)}}{\log r_3}$$

$$n = \frac{\log \dfrac{300 \cdot \sqrt[6]{1.051}}{300 \cdot \sqrt[6]{1.051} - 2180.04 \cdot \left(\sqrt[6]{1.051} - 1\right)}}{\log \sqrt[6]{1.051}} = 7.46 \qquad \boxed{n = 7}$$

Tomislav može primiti ukupno 7 mjesečnih isplata visine 300 €.

Krnja isplata

$$R' = \left(A - R \cdot \frac{r_3^n - 1}{r_3^{n-1} \cdot (r_3 - 1)} \right) \cdot r_3^n$$

Krnja isplata

$$R' = \left(A - R \cdot \frac{r_3^n - 1}{r_3^{n-1} \cdot (r_3 - 1)} \right) \cdot r_3^n$$

$$R' = \left(2180.04 - 300 \cdot \frac{\sqrt[6]{1.051}^{7} - 1}{\sqrt[6]{1.051}^{7-1} \cdot \left(\sqrt[6]{1.051} - 1 \right)} \right) \cdot \sqrt[6]{1.051}^{7}$$

Krnja isplata

$$R' = \left(A - R \cdot \frac{r_3^n - 1}{r_3^{n-1} \cdot (r_3 - 1)} \right) \cdot r_3^n$$

$$R' = \left(2180.04 - 300 \cdot \frac{\sqrt[6]{1.051}^{7} - 1}{\sqrt[6]{1.051}^{7-1} \cdot \left(\sqrt[6]{1.051} - 1 \right)} \right) \cdot \sqrt[6]{1.051}^{7}$$

$$R' = 139.19$$

Krnja isplata iznosi $139.19\,€$.

sedmi zadatak

Zadatak 7

Gabrijel kupuje automobil i odlučio je posuditi novac od rođaka. Tri rođaka spremna su mu ustupiti potrebna sredstva, ali uz različite modele vraćanja posuđenog iznosa. Stric Andrija želi da mu Gabrijel vrati 5000 € *za godinu dana,* 4000 € *za dvije godine i* 8000 € *za tri godine. Baka Kata želi* 284 € *krajem svakog mjeseca tijekom sljedećih pet godina. Bratić Marko želi* 9500 € *za godinu dana i po* 2500 € *početkom svake od sljedeće tri godine. Godišnja kamatna stopa je* 6.9%*. Odredite osobu čija je ponuda najpovoljnija i od koje će Gabrijel posuditi novac. Obrazložite svoj odgovor.*

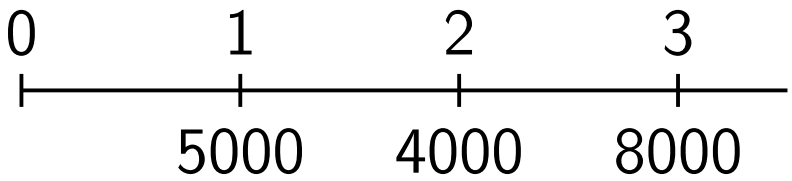
Rješenje

Kako bismo usporedili sve tri ponude, usporedit ćemo njihove diskontirane vrijednosti.

Rješenje

Kako bismo usporedili sve tri ponude, usporedit ćemo njihove diskontirane vrijednosti.

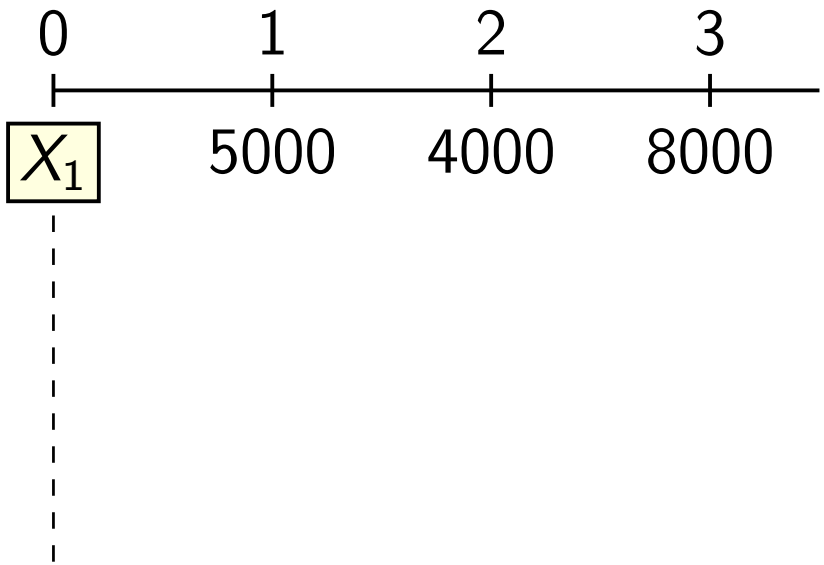
stric Andrija



Rješenje

Kako bismo usporedili sve tri ponude, usporedit ćemo njihove diskontirane vrijednosti.

stric Andrija



Rješenje

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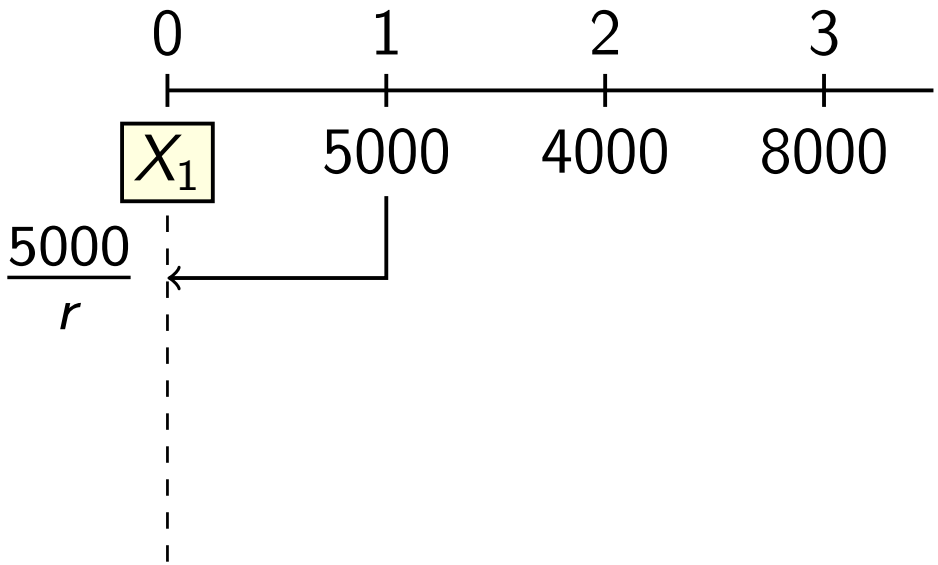
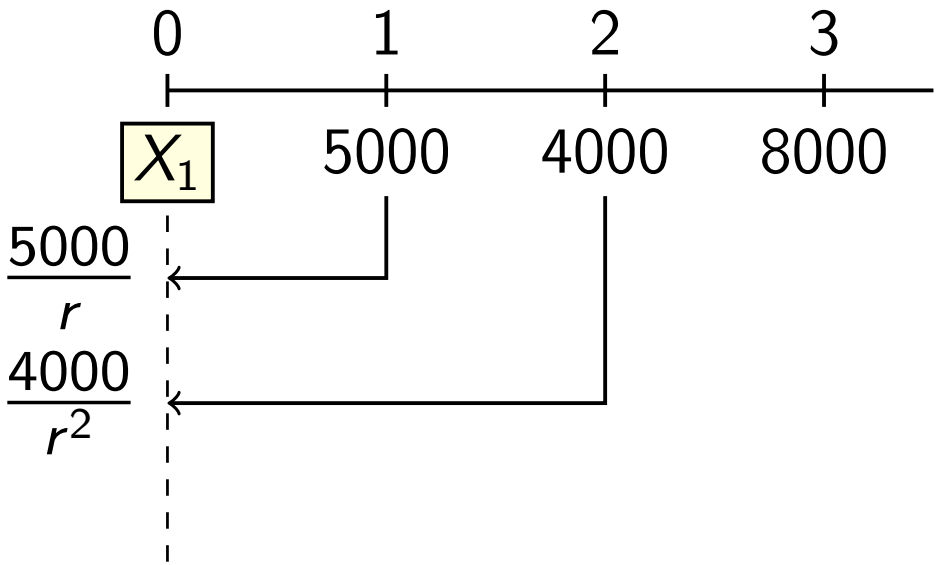
stric Andrija



Rješenje

Kako bismo usporedili sve tri ponude, usporedit ćemo njihove diskontirane vrijednosti.

stric Andrija



Rješenje

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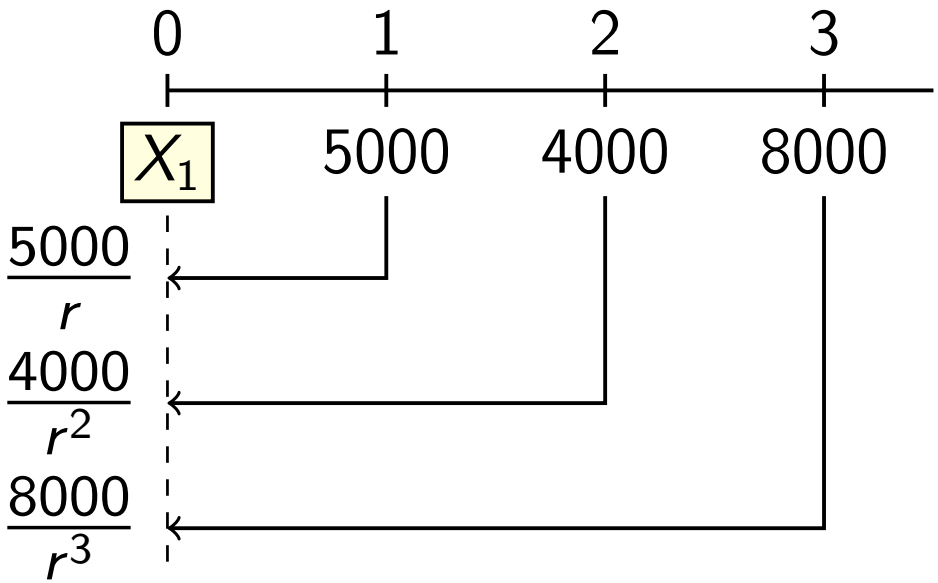
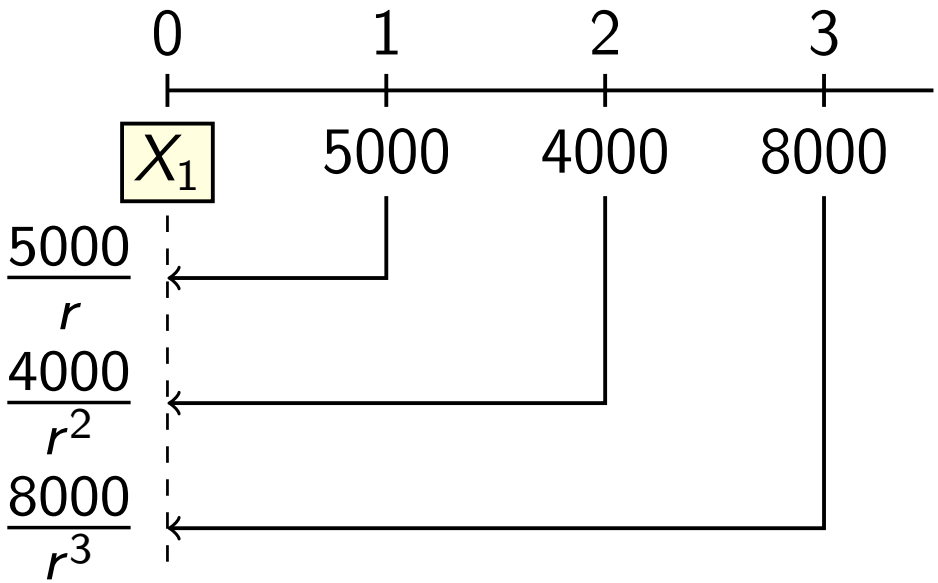
stric Andrija



Rješenje

Kako bismo usporedili sve tri ponude, usporedit ćemo njihove diskontirane vrijednosti.

stric Andrija

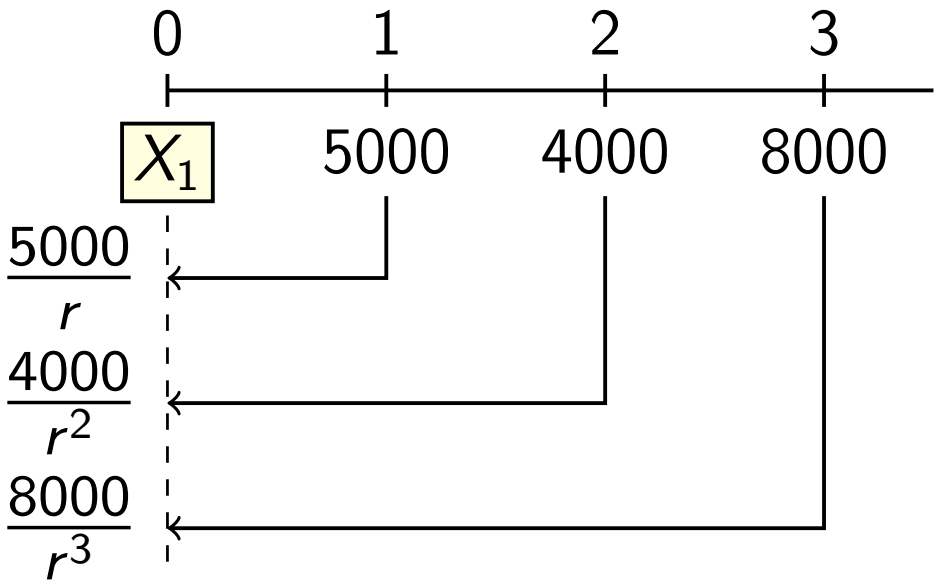


$$X_1 = \frac{5000}{r} + \frac{4000}{r^2} + \frac{8000}{r^3}$$

Rješenje

Kako bismo usporedili sve tri ponude, usporedit ćemo njihove diskontirane vrijednosti.

stric Andrija



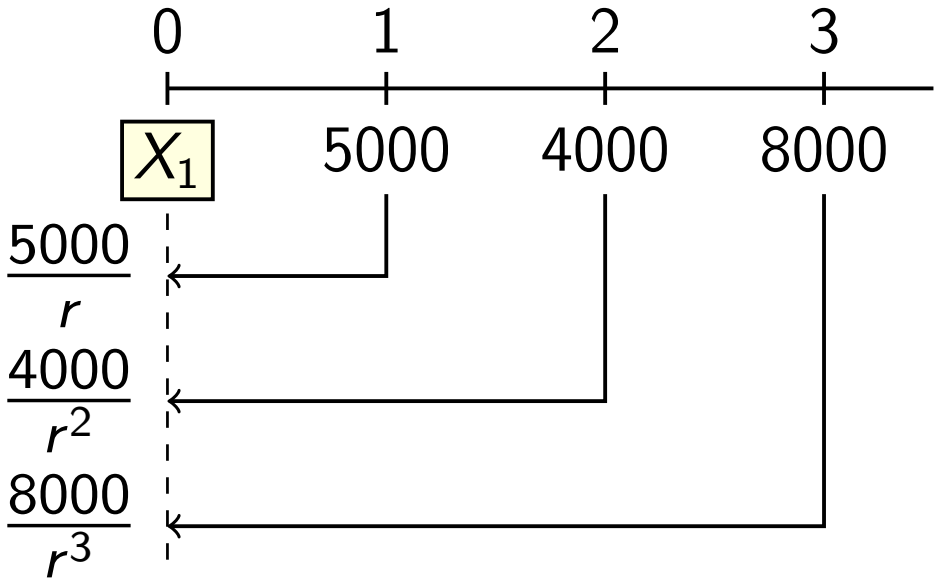
$$X_1 = \frac{5000}{r} + \frac{4000}{r^2} + \frac{8000}{r^3}$$

$$X_1 = \frac{5000}{1.069} + \frac{4000}{1.069^2} + \frac{8000}{1.069^3}$$

Rješenje

Kako bismo usporedili sve tri ponude, usporedit ćemo njihove diskontirane vrijednosti.

stric Andrija



$$X_1 = \frac{5000}{r} + \frac{4000}{r^2} + \frac{8000}{r^3}$$

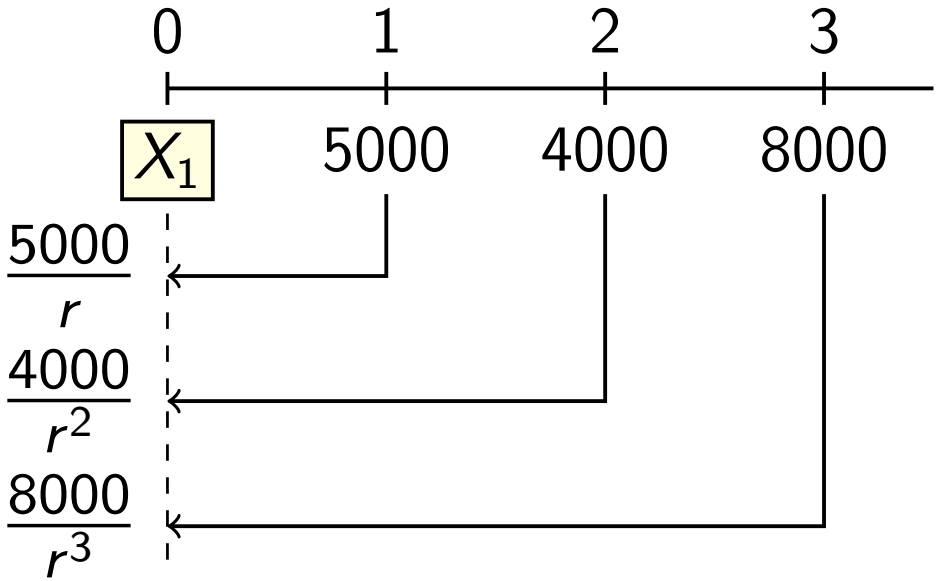
$$X_1 = \frac{5000}{1.069} + \frac{4000}{1.069^2} + \frac{8000}{1.069^3}$$

$$X_1 = 14\,726.29$$

Rješenje

Kako bismo usporedili sve tri ponude, usporedit ćemo njihove diskontirane vrijednosti.

stric Andrija



$$X_1 = \frac{5000}{r} + \frac{4000}{r^2} + \frac{8000}{r^3}$$

$$X_1 = \frac{5000}{1.069} + \frac{4000}{1.069^2} + \frac{8000}{1.069^3}$$

$$X_1 = 14\,726.29$$

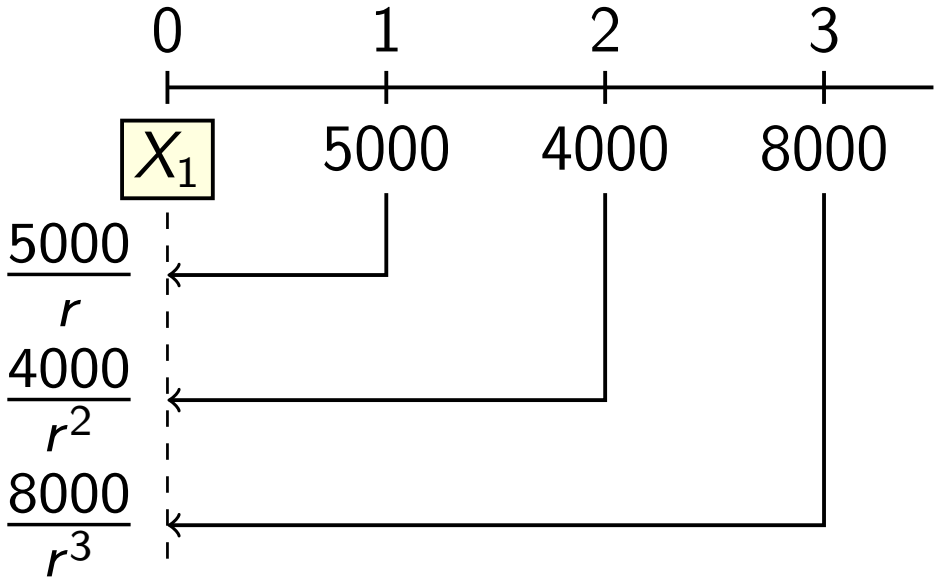
baka Kata

$$A' = R \cdot \frac{r^n - 1}{r^n \cdot (r - 1)}$$

Rješenje

Kako bismo usporedili sve tri ponude, usporedit ćemo njihove diskontirane vrijednosti.

stric Andrija



$$X_1 = \frac{5000}{r} + \frac{4000}{r^2} + \frac{8000}{r^3}$$

$$X_1 = \frac{5000}{1.069} + \frac{4000}{1.069^2} + \frac{8000}{1.069^3}$$

$$X_1 = 14\,726.29$$

baka Kata

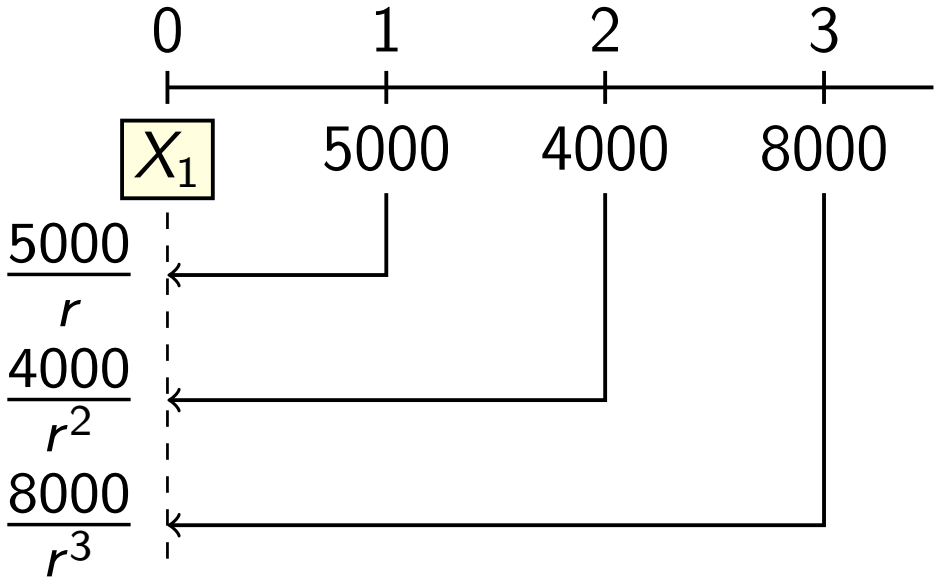
$$A' = R \cdot \frac{r^n - 1}{r^n \cdot (r-1)}$$

$$X_2 = 284 \cdot \frac{\sqrt[12]{1.069}^{60} - 1}{\sqrt[12]{1.069}^{60} \cdot \left(\sqrt[12]{1.069} - 1\right)}$$

Rješenje

Kako bismo usporedili sve tri ponude, usporedit ćemo njihove diskontirane vrijednosti.

stric Andrija



$$X_1 = \frac{5000}{r} + \frac{4000}{r^2} + \frac{8000}{r^3}$$

$$X_1 = \frac{5000}{1.069} + \frac{4000}{1.069^2} + \frac{8000}{1.069^3}$$

$$X_1 = 14\,726.29$$

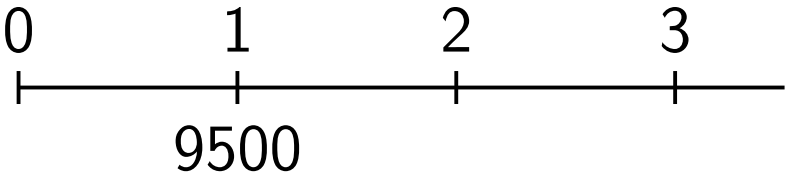
baka Kata

$$A' = R \cdot \frac{r^n - 1}{r^n \cdot (r-1)}$$

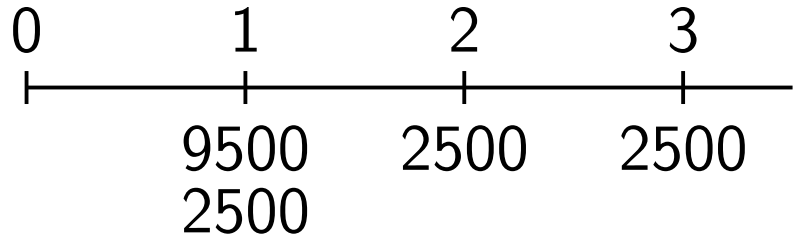
$$X_2 = 284 \cdot \frac{\sqrt[12]{1.069}^{60} - 1}{\sqrt[12]{1.069}^{60} \cdot \left(\sqrt[12]{1.069} - 1\right)}$$

$$X_2 = 14\,448.73$$

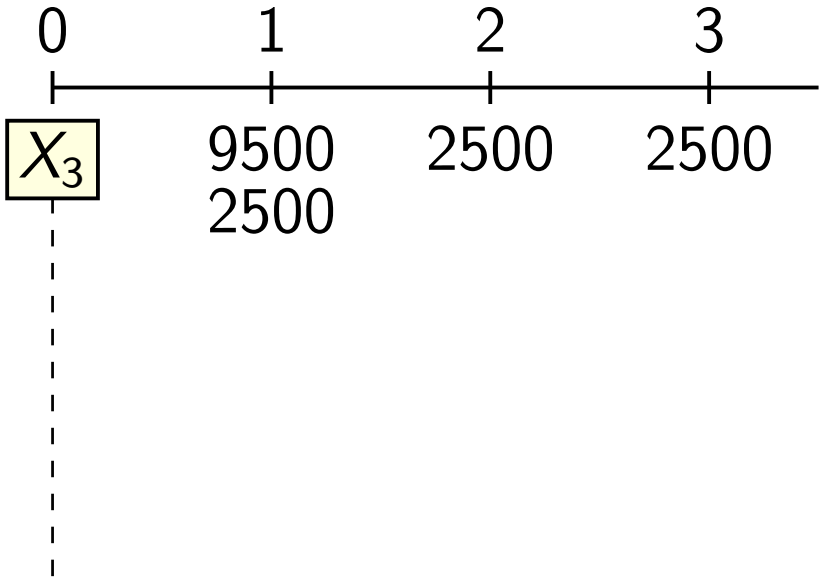
bratić Marko



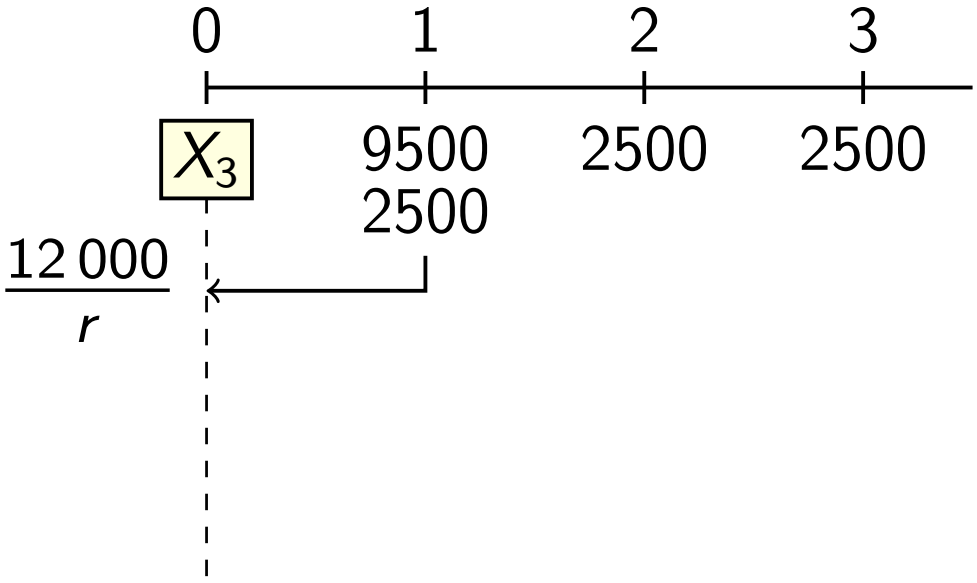
bratić Marko



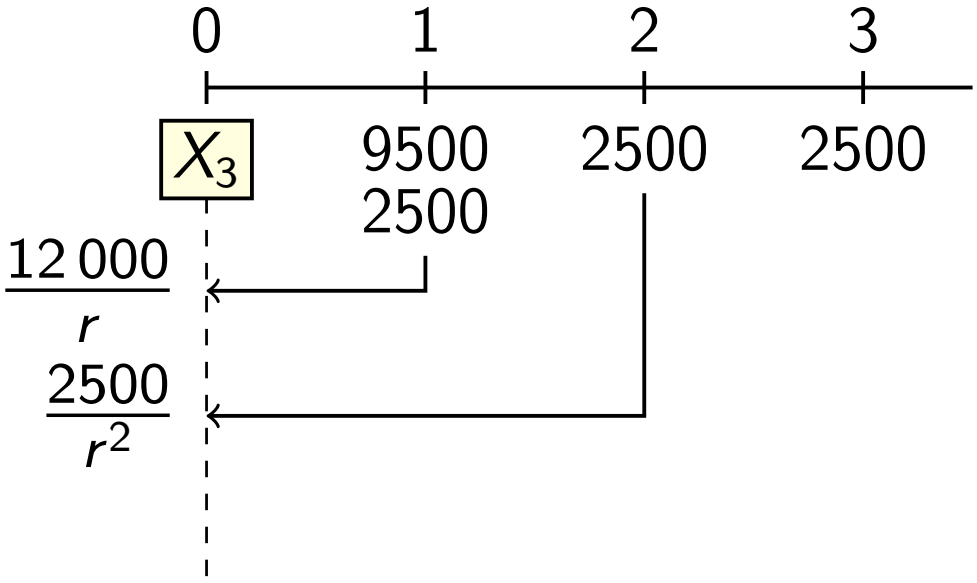
bratić Marko

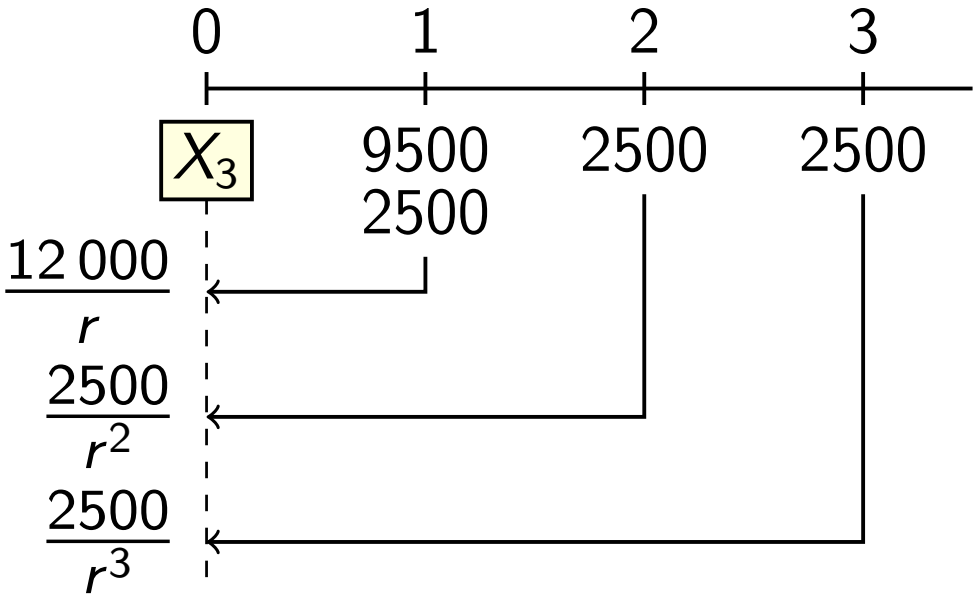


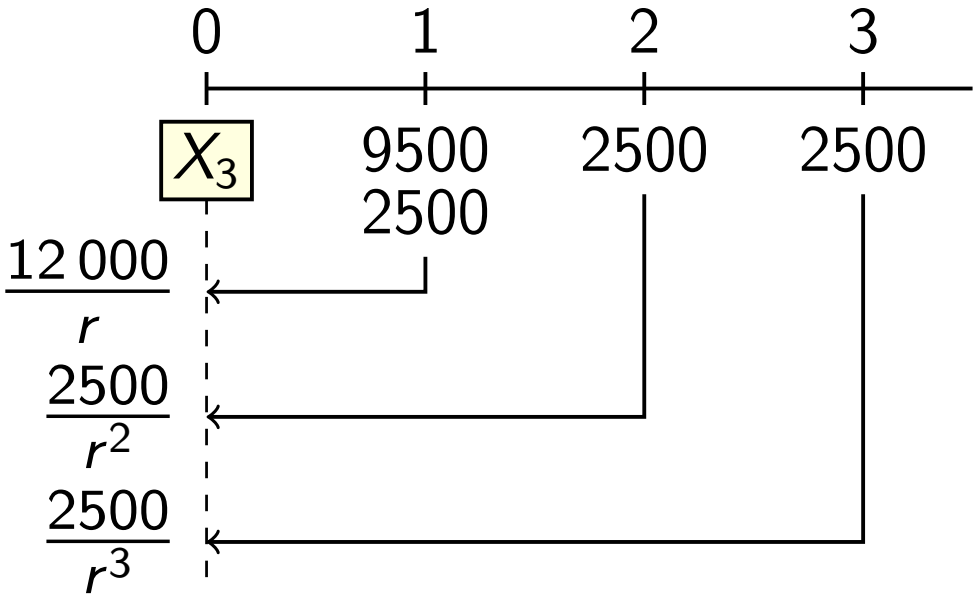
bratić Marko



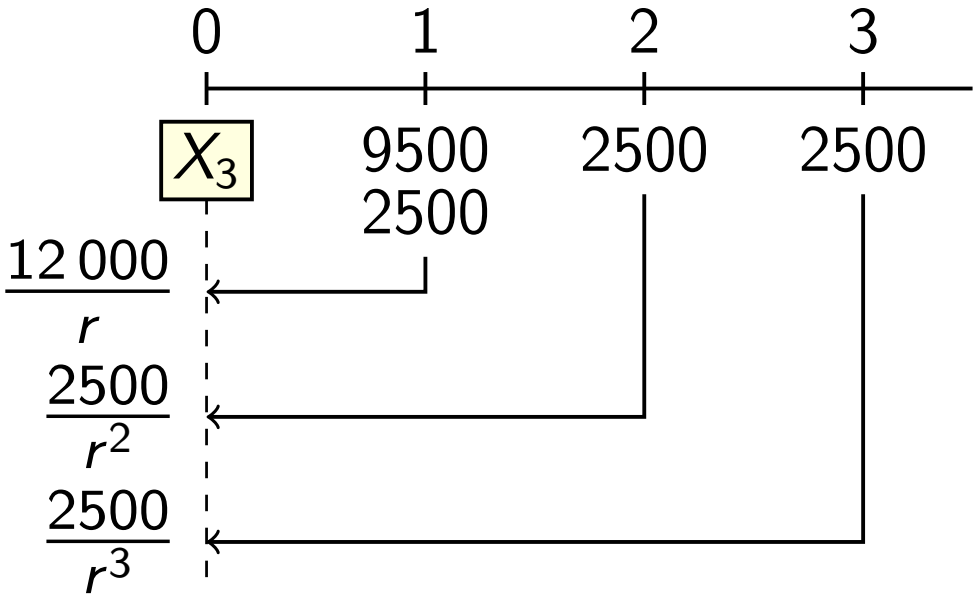
bratić Marko




0
1
2
3
X_3
9500
2500
2500
2500
$\frac{12\,000}{r}$
$\frac{2500}{r^2}$
$\frac{2500}{r^3}$



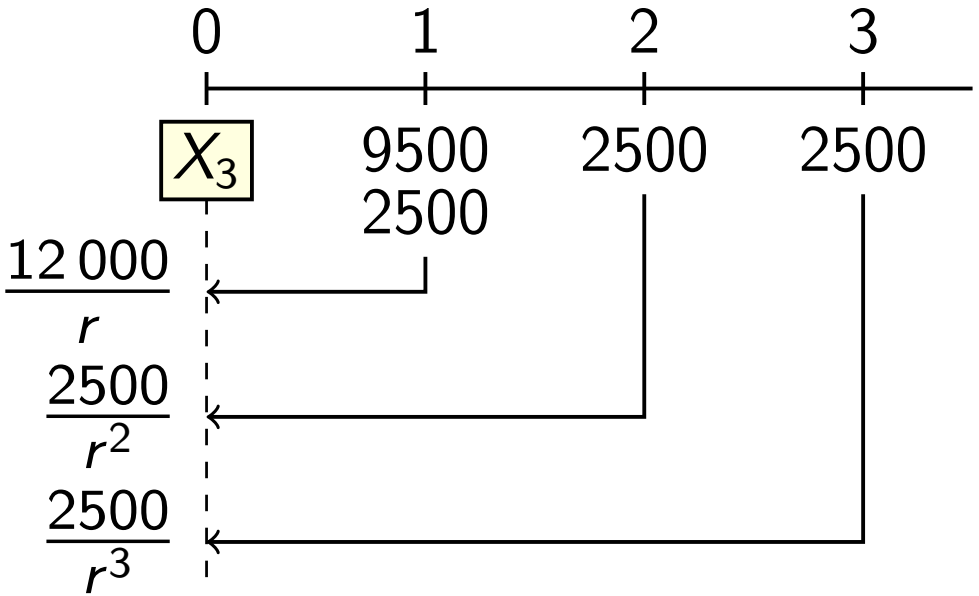
$$X_3 = \frac{12\,000}{r} + \frac{2500}{r^2} + \frac{2500}{r^3}$$



$$X_3 = \frac{12\,000}{r} + \frac{2500}{r^2} + \frac{2500}{r^3}$$

$$X_3 = \frac{12\,000}{1.069} + \frac{2500}{1.069^2} + \frac{2500}{1.069^3}$$

bratić Marko

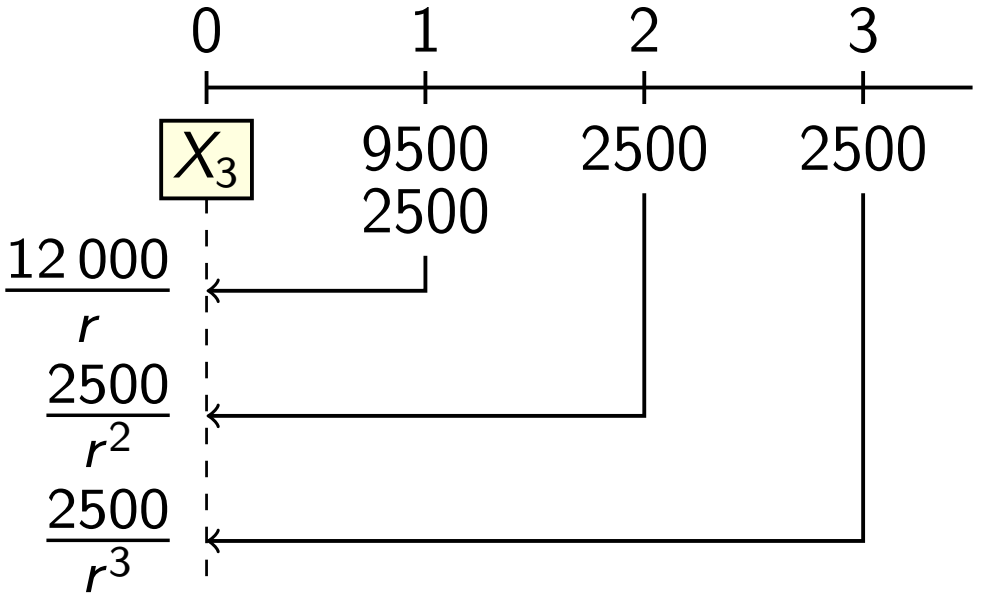


$$X_3 = \frac{12\,000}{r} + \frac{2500}{r^2} + \frac{2500}{r^3}$$

$$X_3 = \frac{12\,000}{1.069} + \frac{2500}{1.069^2} + \frac{2500}{1.069^3}$$

$$X_3 = 15\,459.61$$

bratić Marko

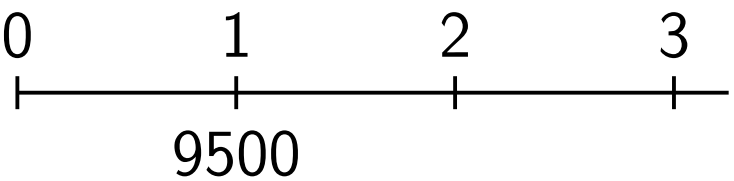


$$X_3 = \frac{12\,000}{r} + \frac{2500}{r^2} + \frac{2500}{r^3}$$

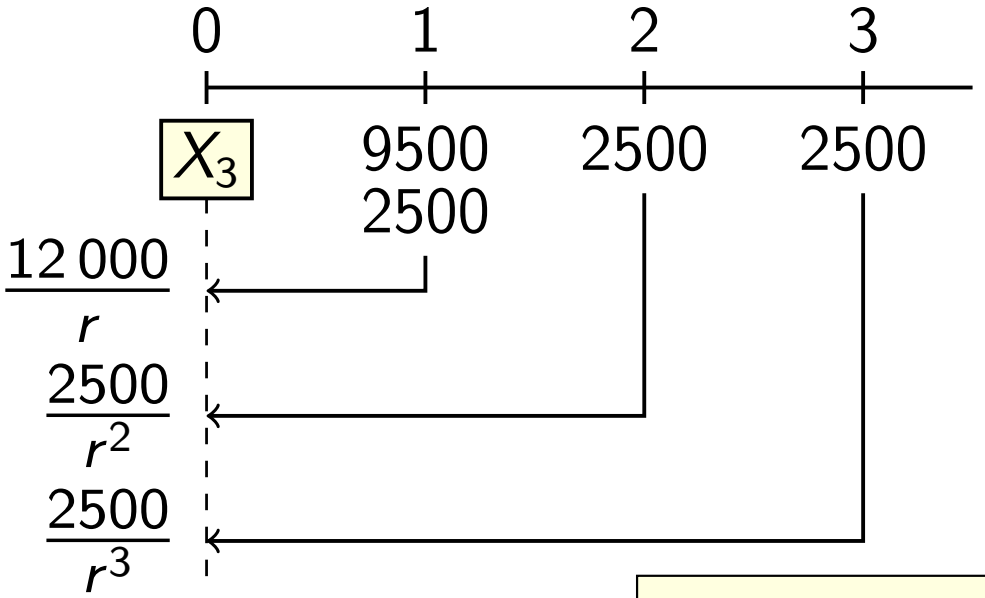
$$X_3 = \frac{12\,000}{1.069} + \frac{2500}{1.069^2} + \frac{2500}{1.069^3}$$

$$X_3 = 15\,459.61$$

drugi način razmišljanja



bratić Marko



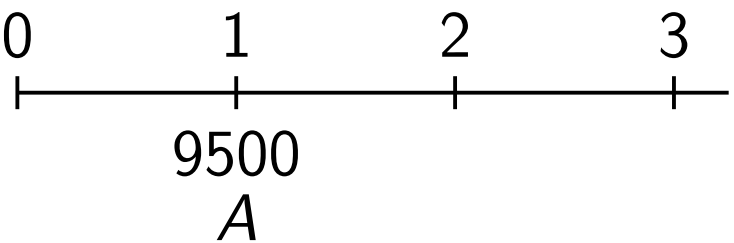
$$X_3 = \frac{12\,000}{r} + \frac{2500}{r^2} + \frac{2500}{r^3}$$

$$X_3 = \frac{12\,000}{1.069} + \frac{2500}{1.069^2} + \frac{2500}{1.069^3}$$

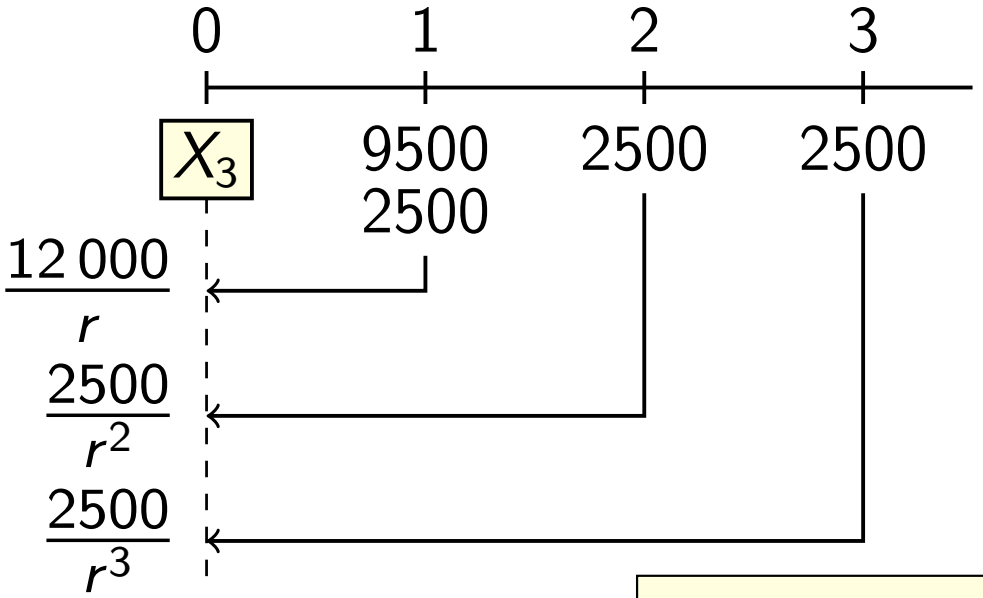
$$X_3 = 15\,459.61$$

drugi način razmišljanja

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)}$$



bratić Marko



$$X_3 = \frac{12\,000}{r} + \frac{2500}{r^2} + \frac{2500}{r^3}$$

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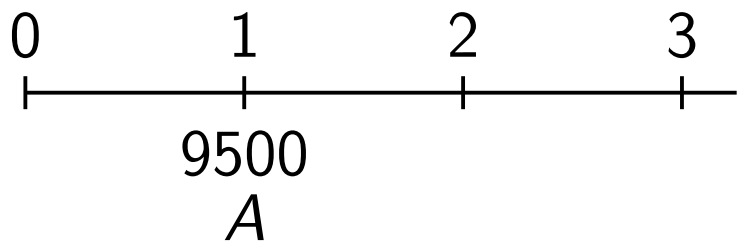
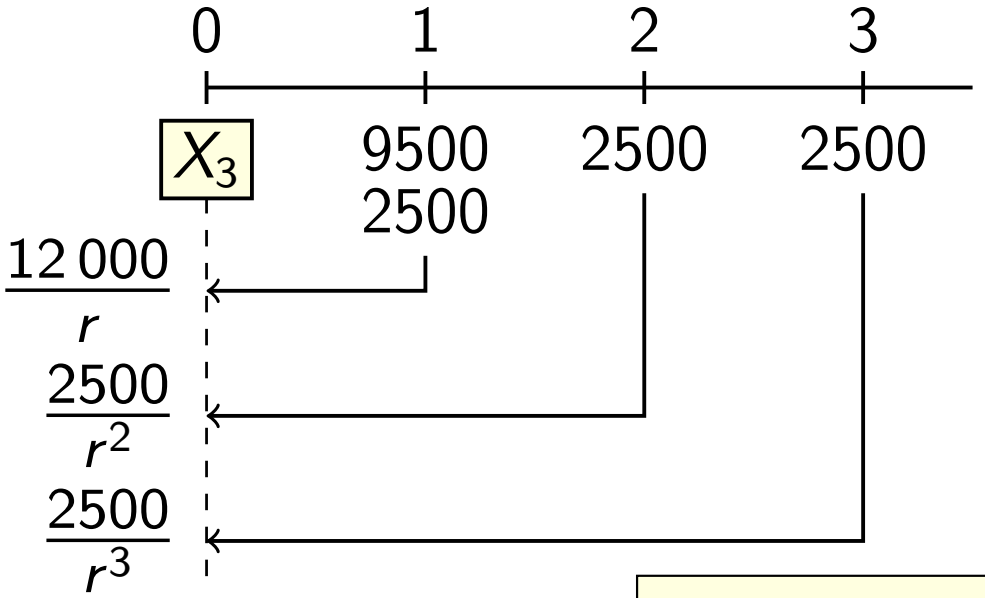


$$A = 2500 \cdot \frac{1.069^3 - 1}{1.069^{3-1} \cdot (1.069 - 1)}$$

bratić Marko



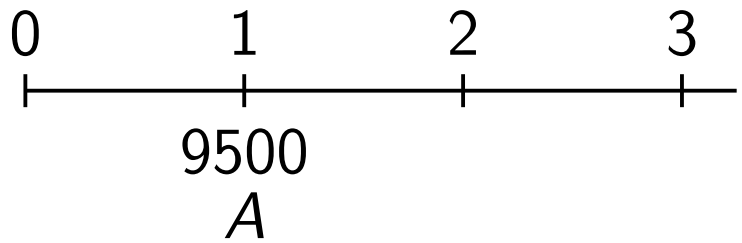
$$X_3 = \frac{12\,000}{r} + \frac{2500}{r^2} + \frac{2500}{r^3}$$

$$X_3 = \frac{12\,000}{1.069} + \frac{2500}{1.069^2} + \frac{2500}{1.069^3}$$

$$X_3 = 15\,459.61$$

drugi način razmišljanja

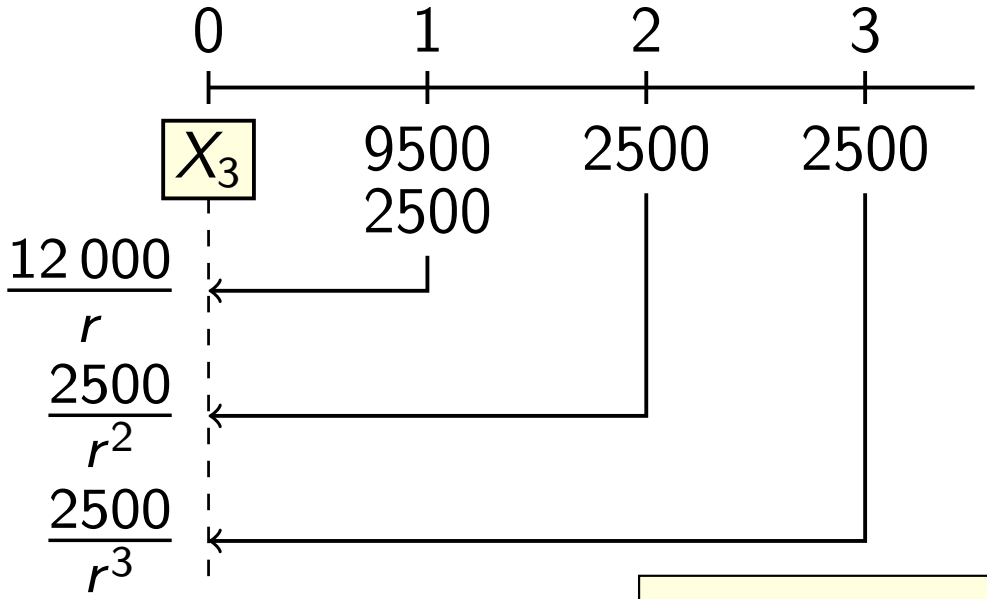
$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)}$$



$$A = 2500 \cdot \frac{1.069^3 - 1}{1.069^{3-1} \cdot (1.069 - 1)}$$

$$A = 7026.32$$

bratić Marko



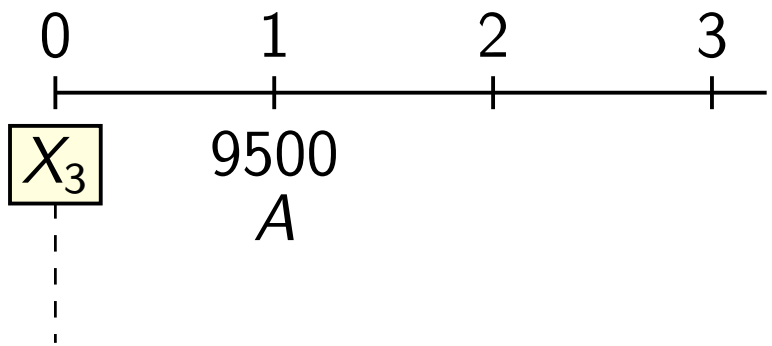
$$X_3 = \frac{12\,000}{r} + \frac{2500}{r^2} + \frac{2500}{r^3}$$

$$X_3 = \frac{12\,000}{1.069} + \frac{2500}{1.069^2} + \frac{2500}{1.069^3}$$

$$X_3 = 15\,459.61$$

drugi način razmišljanja

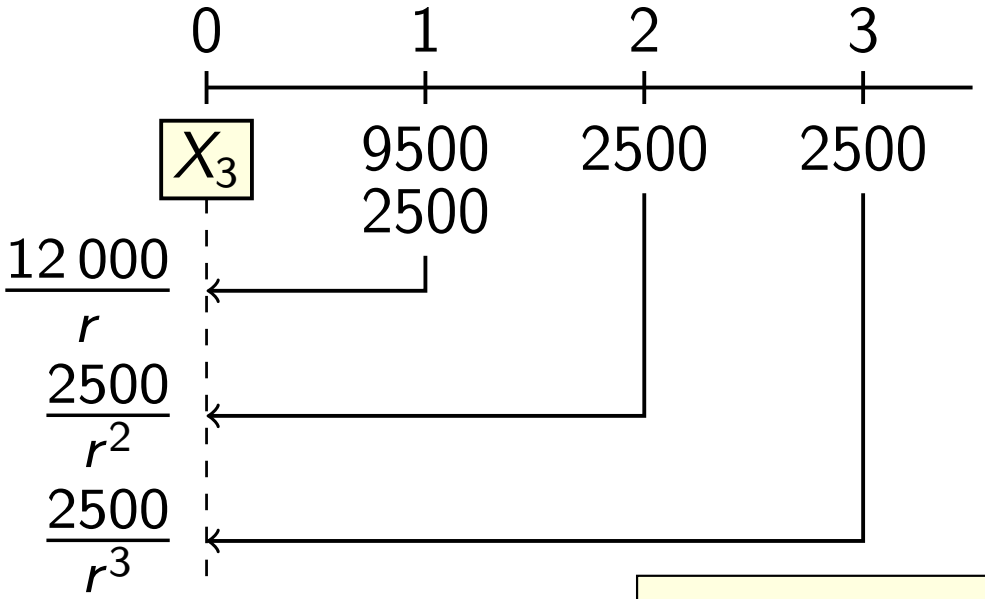
$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)}$$



$$A = 2500 \cdot \frac{1.069^3 - 1}{1.069^{3-1} \cdot (1.069 - 1)}$$

$$A = 7026.32$$

bratić Marko



$$X_3 = \frac{12\,000}{r} + \frac{2500}{r^2} + \frac{2500}{r^3}$$

$$X_3 = \frac{12\,000}{1.069} + \frac{2500}{1.069^2} + \frac{2500}{1.069^3}$$

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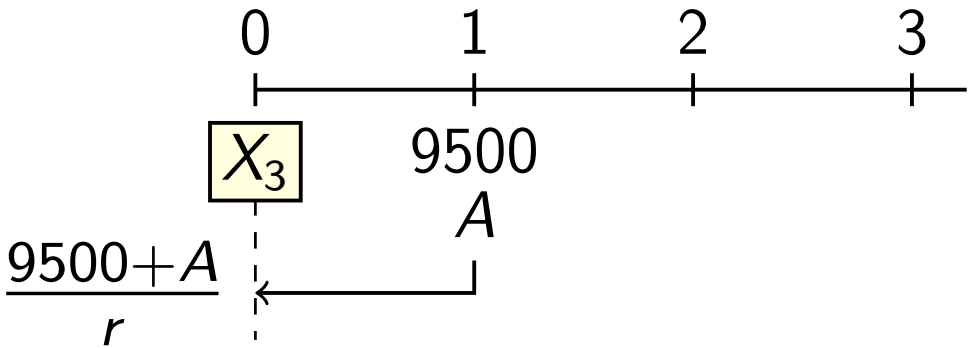
$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)}$$



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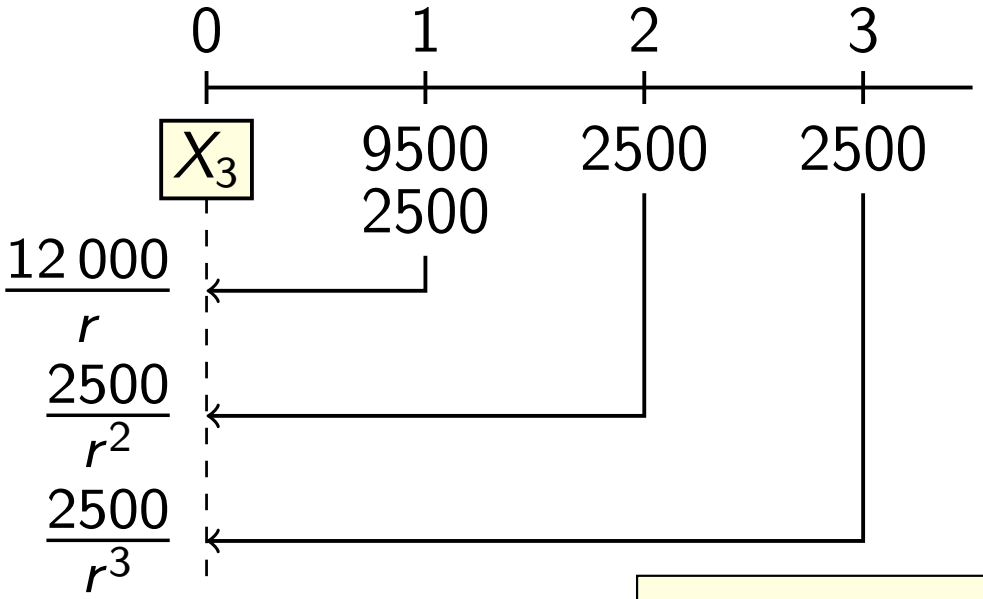
bratić Marko



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$$X_3 = \frac{12\,000}{1.069} + \frac{2500}{1.069^2} + \frac{2500}{1.069^3}$$

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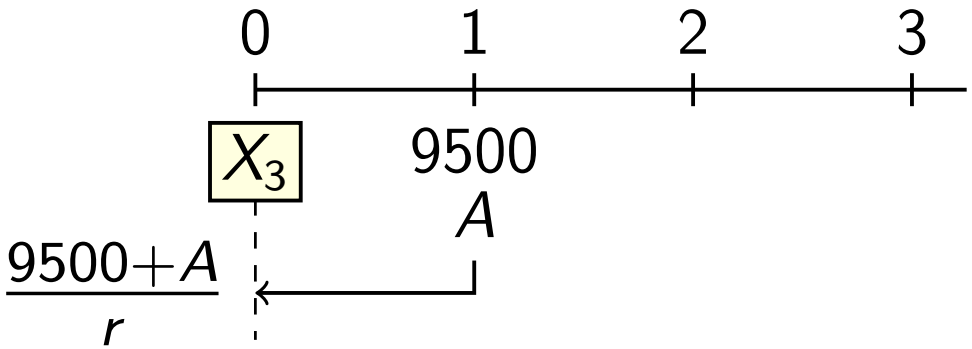
$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)}$$

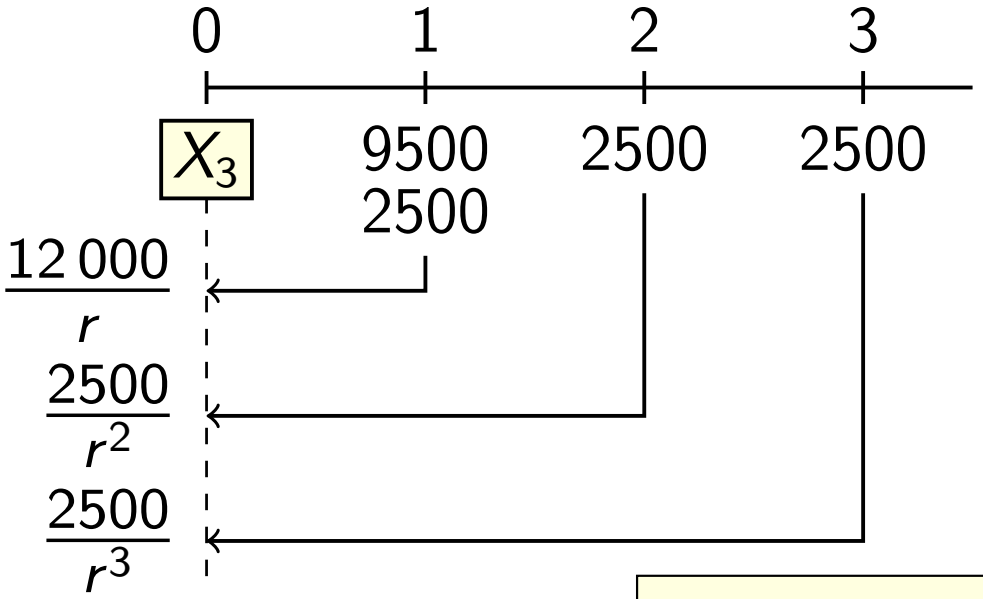


$$A = 2500 \cdot \frac{1.069^3 - 1}{1.069^{3-1} \cdot (1.069 - 1)}$$

$$A = 7026.32$$

$$X_3 = \frac{9500 + A}{r} = \frac{9500 + 7026.32}{1.069}$$

bratić Marko



$$X_3 = \frac{12\,000}{r} + \frac{2500}{r^2} + \frac{2500}{r^3}$$

$$X_3 = \frac{12\,000}{1.069} + \frac{2500}{1.069^2} + \frac{2500}{1.069^3}$$

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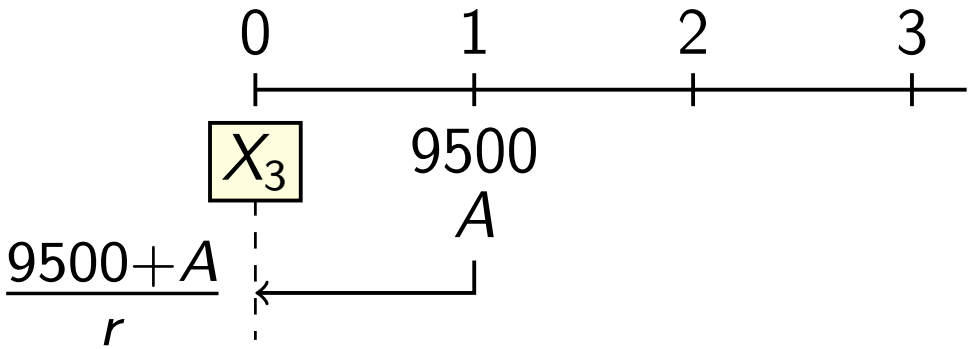
drugi način razmišljanja

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)}$$



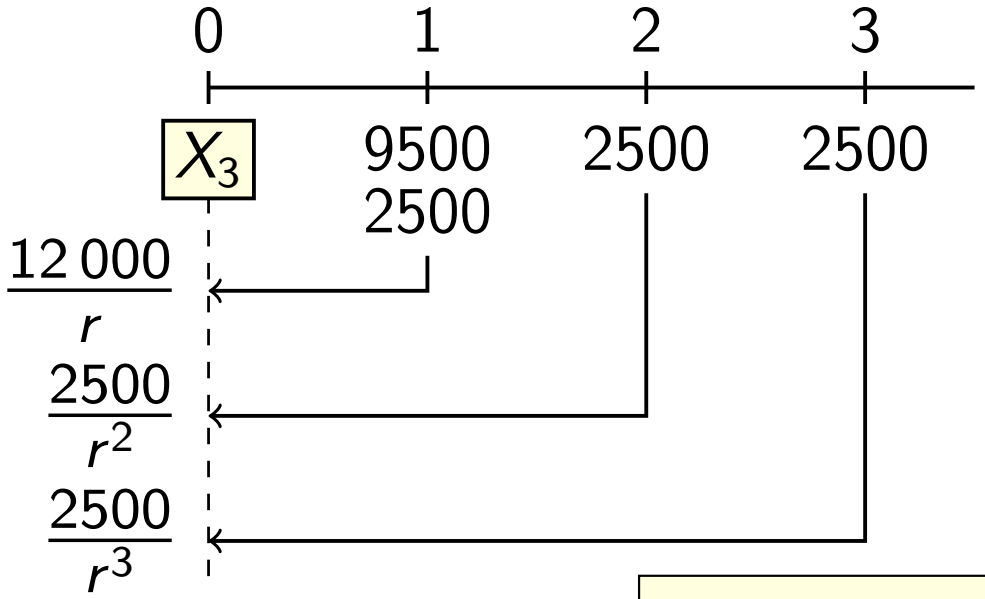
$$A = 2500 \cdot \frac{1.069^3 - 1}{1.069^{3-1} \cdot (1.069 - 1)}$$

$$A = 7026.32$$

$$X_3 = \frac{9500 + A}{r} = \frac{9500 + 7026.32}{1.069}$$

$$X_3 = 15\,459.61$$

bratić Marko



$$X_3 = \frac{12\,000}{r} + \frac{2500}{r^2} + \frac{2500}{r^3}$$

$$X_3 = \frac{12\,000}{1.069} + \frac{2500}{1.069^2} + \frac{2500}{1.069^3}$$

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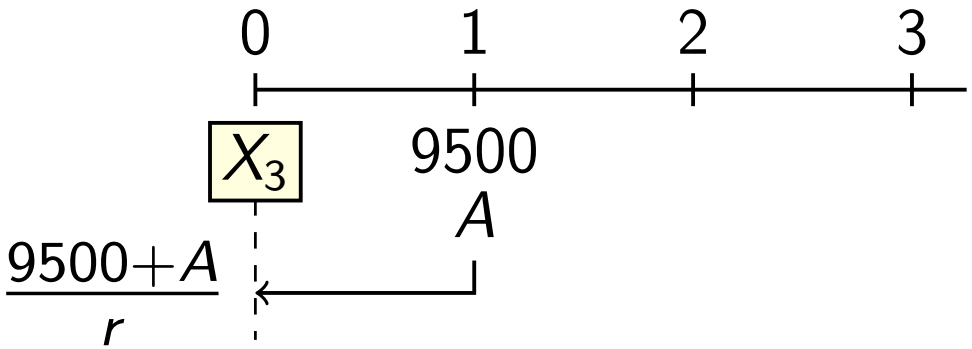
drugi način razmišljanja

$$A = R \cdot \frac{r^n - 1}{r^{n-1} \cdot (r-1)}$$



$$A = 2500 \cdot \frac{1.069^3 - 1}{1.069^{3-1} \cdot (1.069 - 1)}$$

$$A = 7026.32$$

$$X_3 = \frac{9500 + A}{r} = \frac{9500 + 7026.32}{1.069}$$

$$X_3 = 15\,459.61$$

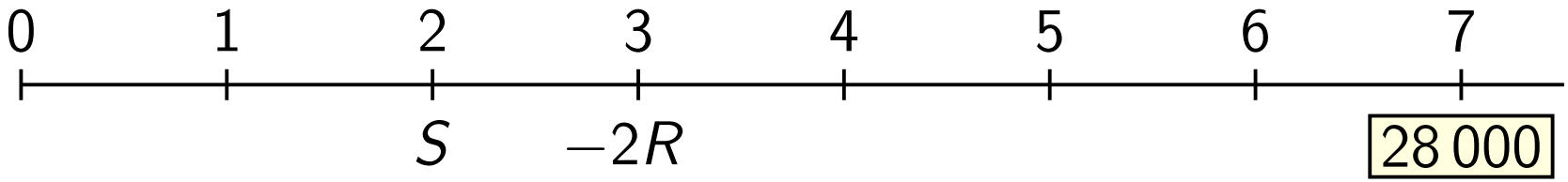
Za Gabrijela je najpovoljnija ponuda bake Kate jer njezina ponuda ima najmanju sadašnju vrijednost.

osmi zadatak

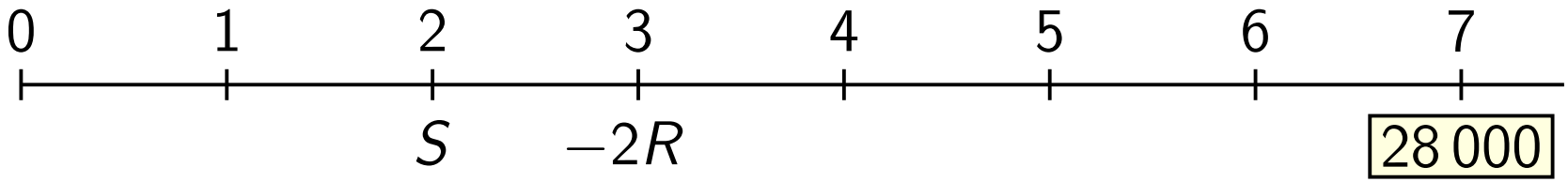
Zadatak 8

Osam puta, početkom svakog kvartala, netko uplati nepoznati iznos. Točno tri godine nakon prve uplate podigne dvostruku vrijednost tog iznosa. O kojem se iznosu radi ako sedam godina nakon prve uplate ima $28\,000$ *kn? Obavezno skicirajte tijek novca. Nominalna godišnja kamatna stopa iznosi* 11%.

Rješenje

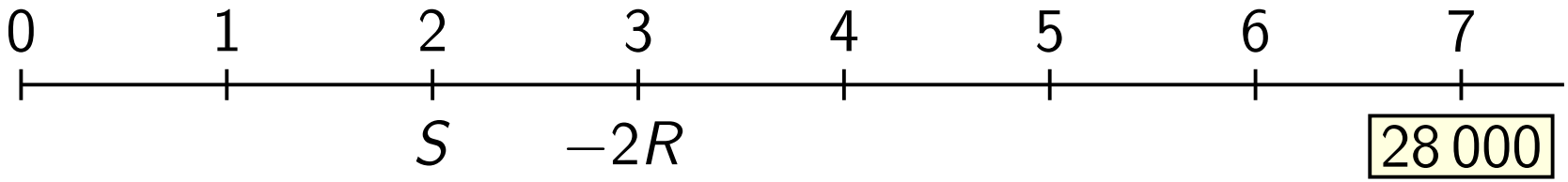


Rješenje



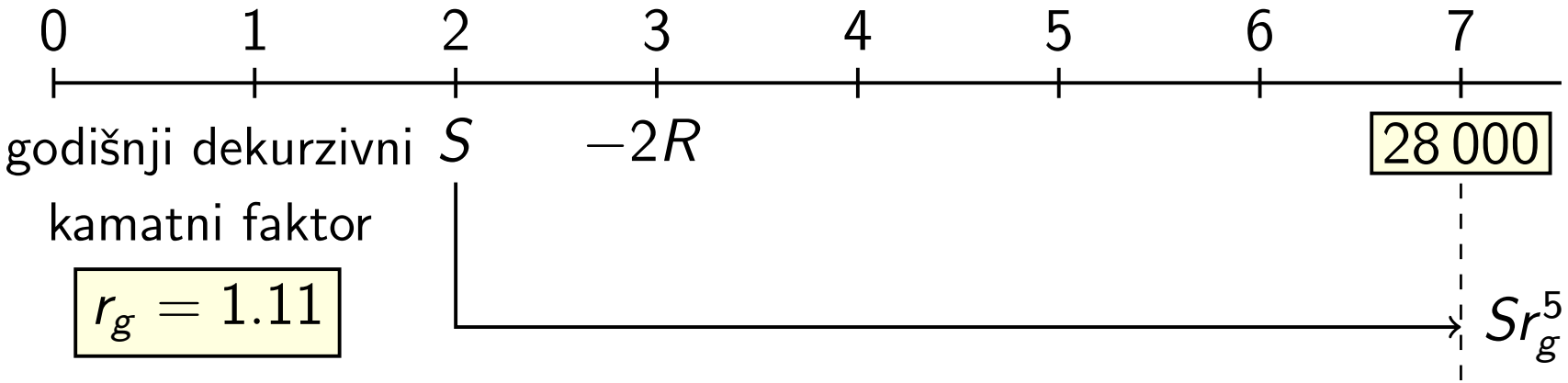
$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1}$$

Rješenje



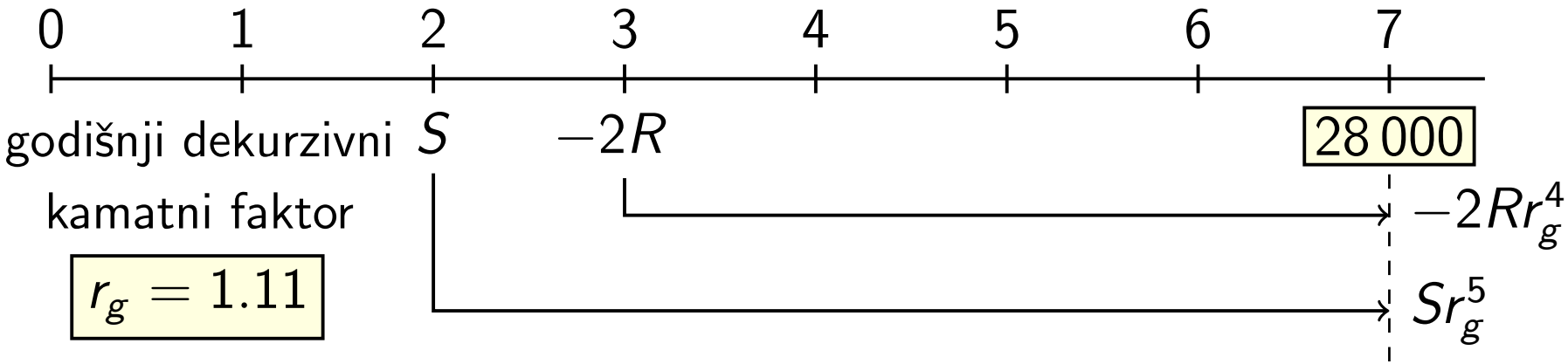
$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = R \cdot \sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{\,8} - 1}{\sqrt[4]{1.11} - 1}$$

Rješenje



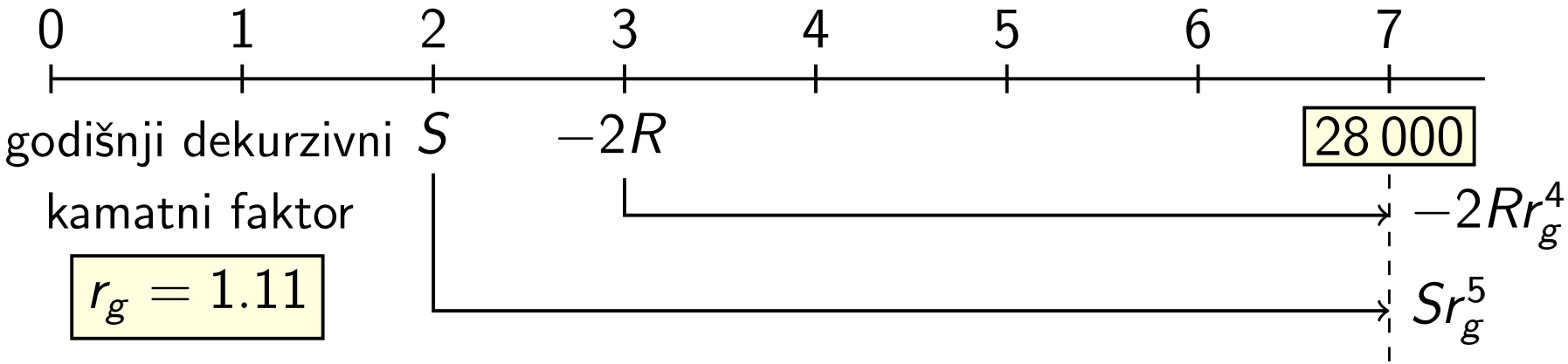
$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = R \cdot \sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{\,8} - 1}{\sqrt[4]{1.11} - 1}$$

Rješenje



$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = R \cdot \sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{\,8} - 1}{\sqrt[4]{1.11} - 1}$$

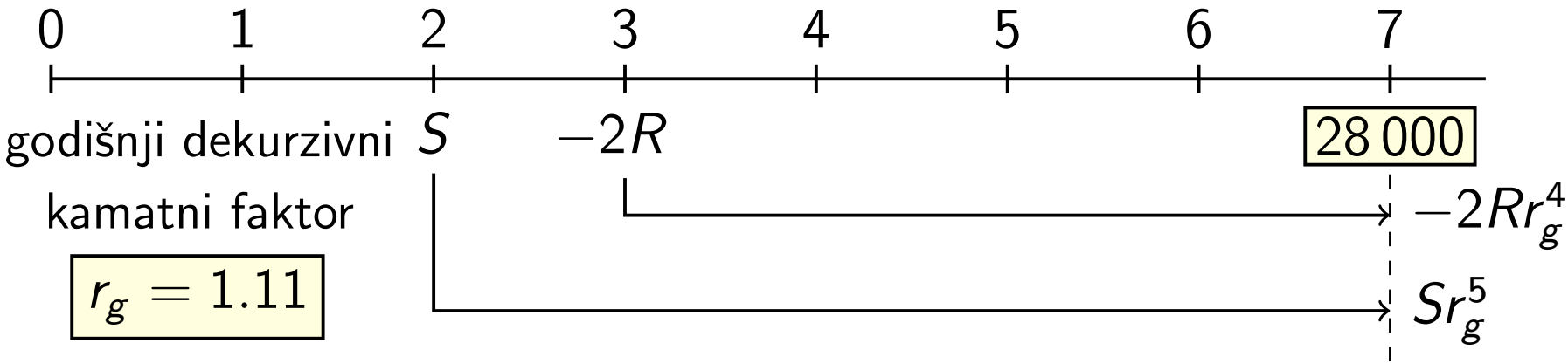
Rješenje



$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = R \cdot \sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{\,8} - 1}{\sqrt[4]{1.11} - 1}$$

$$Sr_g^5 - 2Rr_g^4 = 28\,000$$

Rješenje



$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} = R \cdot \sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{\,8} - 1}{\sqrt[4]{1.11} - 1}$$

$$Sr_g^5 - 2Rr_g^4 = 28\,000$$

$$R \cdot \sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{\,8} - 1}{\sqrt[4]{1.11} - 1} \cdot 1.11^5 - 2R \cdot 1.11^4 = 28\,000$$

$$R \cdot \sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{8} - 1}{\sqrt[4]{1.11} - 1} \cdot 1.11^{5} - 2R \cdot 1.11^{4} = 28\,000$$

$$R \cdot \sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{8} - 1}{\sqrt[4]{1.11} - 1} \cdot 1.11^{5} - 2R \cdot 1.11^{4} = 28\,000$$

$$R \cdot \left(\sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{8} - 1}{\sqrt[4]{1.11} - 1} \cdot 1.11^{5} - 2 \cdot 1.11^{4} \right) = 28\,000$$

$$R \cdot \sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{8} - 1}{\sqrt[4]{1.11} - 1} \cdot 1.11^{5} - 2R \cdot 1.11^{4} = 28\,000$$

$$R \cdot \left(\sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{8} - 1}{\sqrt[4]{1.11} - 1} \cdot 1.11^{5} - 2 \cdot 1.11^{4} \right) = 28\,000$$

$$R = \frac{28\,000}{\sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{8} - 1}{\sqrt[4]{1.11} - 1} \cdot 1.11^{5} - 2 \cdot 1.11^{4}}$$

$$R \cdot \sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{8} - 1}{\sqrt[4]{1.11} - 1} \cdot 1.11^{5} - 2R \cdot 1.11^{4} = 28\,000$$

$$R \cdot \left(\sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{8} - 1}{\sqrt[4]{1.11} - 1} \cdot 1.11^{5} - 2 \cdot 1.11^{4} \right) = 28\,000$$

$$R = \frac{28\,000}{\sqrt[4]{1.11} \cdot \frac{\sqrt[4]{1.11}^{8} - 1}{\sqrt[4]{1.11} - 1} \cdot 1.11^{5} - 2 \cdot 1.11^{4}}$$

$$R = 2304.38$$

Domaća zadaća

Domaća zadaća

Zadatak 9

Koliko je najmanje mjesečnih uplata iznosa 1200 *kn potrebno, kako bi uz godišnju kamatnu stopu* 6.5% *njihova konačna vrijednost bila* 100 000 *kn?*

Domaća zadaća

Zadatak 9

Koliko je najmanje mjesečnih uplata iznosa 1200 *kn potrebno, kako bi uz godišnju kamatnu stopu* 6.5% *njihova konačna vrijednost bila* 100 000 *kn?*

Rješenje

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} \qquad n = \frac{\log\left(\frac{S(r-1)}{Rr} + 1\right)}{\log r}$$

Domaća zadaća

Zadatak 9

Koliko je najmanje mjesečnih uplata iznosa $1200\,kn$ *potrebno, kako bi uz godišnju kamatnu stopu* 6.5% *njihova konačna vrijednost bila* $100\,000\,kn$*?*

Rješenje

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} \qquad n = \frac{\log\left(\frac{S(r-1)}{Rr} + 1\right)}{\log r}$$

$$n = \frac{\log\left(\frac{100\,000 \cdot \left(\sqrt[12]{1.065} - 1\right)}{1200 \cdot \sqrt[12]{1.065}} + 1\right)}{\log \sqrt[12]{1.065}}$$

Domaća zadaća

Zadatak 9

Koliko je najmanje mjesečnih uplata iznosa $1200\,kn$ *potrebno, kako bi uz godišnju kamatnu stopu* 6.5% *njihova konačna vrijednost bila* $100\,000\,kn$*?*

Rješenje

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} \qquad n = \frac{\log\left(\frac{S(r-1)}{Rr} + 1\right)}{\log r}$$

$$n = \frac{\log\left(\frac{100\,000 \cdot \left(\sqrt[12]{1.065} - 1\right)}{1200 \cdot \sqrt[12]{1.065}} + 1\right)}{\log \sqrt[12]{1.065}} = 68.98$$

Domaća zadaća

Zadatak 9

Koliko je najmanje mjesečnih uplata iznosa 1200 *kn potrebno, kako bi uz godišnju kamatnu stopu* 6.5% *njihova konačna vrijednost bila* 100 000 *kn?*

Rješenje

Potrebno je barem 69 uplata.

$$S = R \cdot r \cdot \frac{r^n - 1}{r - 1} \qquad n = \frac{\log\left(\frac{S(r-1)}{Rr} + 1\right)}{\log r}$$

$$n = \frac{\log\left(\frac{100\,000 \cdot \left(\sqrt[12]{1.065} - 1\right)}{1200 \cdot \sqrt[12]{1.065}} + 1\right)}{\log \sqrt[12]{1.065}} = 68.98$$

Domaća zadaća

Zadatak 10

Rukometni klub je organizirao zabavu na kojoj je od sponzora, ulaznica i prodaje pića zaradio 25 820 *kn.*

a) *Koliko mjesečno može trošiti (troškovi se namiruju krajem mjeseca) ako je sljedeća zabava za dvije godine, a u međuvremenu nema dodatnih prihoda?*

b) *Ako klubu za normalan rad mjesečno treba* 1 500 *kn, za koliko će mjeseci navedeni iznos biti dovoljan?*

c) *Koliki bi iznos svaki od* 10 *igrača morao uplatiti jednokratno na početku dvogodišnjeg perioda kako klub ne bi upao u financijske probleme?*

Godišnja kamatna stopa je 7.2%.

Rješenje

a) $A' = 25\,820, \quad n = 24, \quad r = \sqrt[12]{1.072}$

$$A' = R \cdot \frac{r^n - 1}{r^n \cdot (r-1)} \qquad R = \frac{A' \cdot r^n \cdot (r-1)}{r^n - 1}$$

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Klub mjesečno može trošiti 1155.71 kn.

b) $A' = 25\,820, \quad R = 1500, \quad r = \sqrt[12]{1.072}$

$$A' = R \cdot \frac{r^n - 1}{r^n \cdot (r-1)} \qquad n = \frac{\log \frac{R}{R - A' \cdot (r-1)}}{\log r}$$

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Iznos će biti dovoljan za 18 mjeseci.

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$$\frac{A_1' - A'}{10} = 769.19$$

Svaki igrač treba platiti 769.19 kn.