

PRÍKLAD 1

$$A = (-1000, 1000, 500)$$

$$B = (-2000, 1700, 1000)$$

$$NPV_A(i) = -1000 + \frac{1000}{1+i} + \frac{500}{(1+i)^2}$$

IRR: $\begin{cases} NPV(i^*) = 0 \\ IRR = i^* \cdot 100\% \end{cases}$

$$-1000 + \frac{1000}{1+i} + \frac{500}{(1+i)^2} = 0 !$$

substitúcia $x = 1+i$ $i \in \langle 0, 1 \rangle \Rightarrow x \in \langle 1, 2 \rangle$

$$-1000 + \frac{1000}{x} + \frac{500}{x^2} = 0 \quad | \cdot \frac{x^2}{-500}$$

$$2x^2 - 2x - 1 = 0$$

$$D = b^2 - 4ac$$

$$D = (-2)^2 - 4 \cdot 2 \cdot (-1) = 12$$

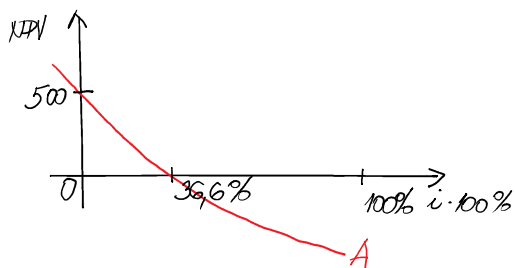
$$\sqrt{D} = 3,464$$

$$x_{1/2} = \frac{-b \pm \sqrt{D}}{2a}$$

$$x_{1/2} = \frac{2 \pm 3,464}{2 \cdot 2} = \begin{cases} 1,366 \in \langle 1, 2 \rangle \\ -0,366 \notin \langle 1, 2 \rangle \end{cases}$$

$$x = 1+i \Rightarrow \begin{aligned} i &= x - 1 \\ i &= 1,366 - 1 \\ i_A^* &= 0,366 \\ IRR_A &= 0,366 \cdot 100\% = 36,6\% \end{aligned}$$

$$NPV_A(0) = -1000 + 1000 + 500 = 500$$



$$NPV_B(i) = -2000 + \frac{1700}{1+i} + \frac{1000}{(1+i)^2}$$

$$NPV_B(i) = 0$$

$$-2000 + \frac{1700}{1+i} + \frac{1000}{(1+i)^2} = 0$$

substitúcia $x = 1+i$

$$-2000 + \frac{1700}{x} + \frac{1000}{x^2} = 0 \quad | \cdot \frac{x^2}{-100}$$

$$20x^2 - 17x - 10 = 0$$

$$D = (-17)^2 - 4 \cdot 20 \cdot (-10) = 1089$$

$$\sqrt{D} = 33$$

$$50 - 115 \in \langle 1, 2 \rangle$$

$$D = (-17)^2 - 4 \cdot 20 \cdot (-10) = 1089$$

$$\sqrt{D} = 33$$

$$X_{1/2} = \frac{17 \pm 33}{2 \cdot 20} = \begin{cases} \frac{50}{40} = 1,25 \in \langle 1,2 \rangle \\ -\frac{16}{40} \notin \langle 1,2 \rangle \\ = -0,4 \end{cases}$$

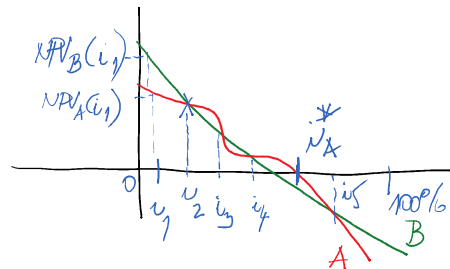
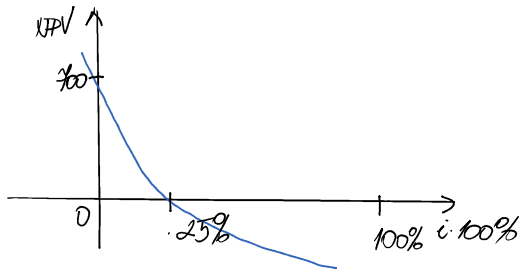
$$X = 1+i \Rightarrow i = X-1$$

$$i = 1,25 - 1$$

$$i^* = 0,25$$

$$IRR_B = 0,25 \cdot 100\% = 25\%$$

$$NPV_B(0) = -2000 + 1700 + 1000 = 700$$



OTÁZKA: KEDY JE VÝNOS Z OBOCH PROJEKTŮ ROVNAKÝ?

$$NPV_A(i) = NPV_B(i)$$

$$-1000 + \frac{1000}{1+i} + \frac{500}{(1+i)^2} = -2000 + \frac{1700}{1+i} + \frac{1000}{(1+i)^2} \quad | +2000 - \frac{1700}{1+i} - \frac{1000}{(1+i)^2}$$

$$1000 - \frac{700}{1+i} - \frac{500}{(1+i)^2} = 0$$

$$\underbrace{1000 - \frac{700}{1+i} - \frac{500}{(1+i)^2}}_{NPV_{A-B}(i)} = 0$$

$$NPV_{A-B}(i) = 0$$

$$X = 1+i$$

$$1000 - \frac{700}{X} - \frac{500}{X^2} = 0 \quad | \cdot \frac{X^2}{100}$$

$$10X^2 - 7X - 5 = 0$$

$$D = (-7)^2 - 4 \cdot 10 \cdot (-5) = 249$$

$$\sqrt{D} = 15,78$$

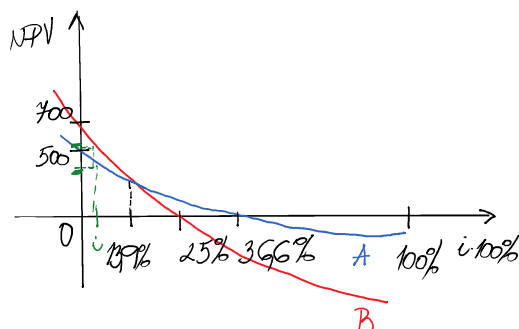
$$X_{1/2} = \frac{7 \pm 15,78}{2 \cdot 10} = \begin{cases} 1,139 \in \langle 1,2 \rangle \\ -0,439 \notin \langle 1,2 \rangle \end{cases}$$

$$X = 1+i \Rightarrow i = X-1$$

$$i = 1,139 - 1$$

$$i^* = 0,139$$

$$IRR_{A-B} = 0,139 \cdot 100\% = 13,9\% \quad NPV_A(i) = NPV_B(i)$$



ZÁVĚR:

$i \cdot 100\% \in \langle 0\%; 13,9\% \rangle$ je výhodnější projekt B
 $i \cdot 100\% \in (13,9\%; 36,6\%)$ je výhodnější A
 $i \cdot 100\% \in (25\%; 36,6\%)$ je přijatelný len A

$i \cdot 100\% \in (10\%, 15\%) \Rightarrow 10\%$
 $i \cdot 100\% \in (25\%; 36,6\%)$ je přijatelný lev A

PRÍKLAD 2

$A = (300, -400, 600)$
 $B = (-700, 1300, -100)$

IRR: $\begin{cases} NPV(i^*) = 0 \\ IRR = i^* \cdot 100\% \end{cases}$

$NPV_A(i) = 300 - \frac{400}{1+i} + \frac{600}{(1+i)^2}$

$NPV_A(i) = 0$

$300 - \frac{400}{1+i} + \frac{600}{(1+i)^2} = 0$

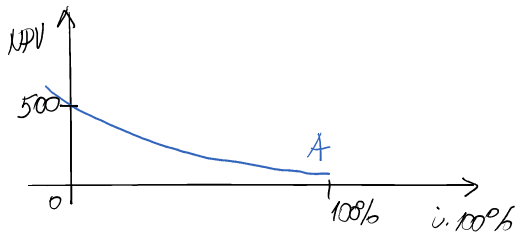
substitúcia $x = 1+i$ $i \in \langle 0, 1 \rangle \Rightarrow x \in \langle 1, 2 \rangle$

$300 - \frac{400}{x} + \frac{600}{x^2} = 0 \quad / \cdot \frac{x^2}{100}$

$3x^2 - 4x + 6 = 0$

$D = (-4)^2 - 4 \cdot 3 \cdot 6 = -56 < 0 \Rightarrow$ NEEXISTUJÚ REÁLNE KORENE

$NPV(0) = 300 - 400 + 600 = 500$



PROJEKT A JE VŽDY PŘIJATELNÝ

$NPV_B(i) = -700 + \frac{1300}{1+i} - \frac{100}{(1+i)^2}$

$NPV_B(i) = 0$

$-700 + \frac{1300}{1+i} - \frac{100}{(1+i)^2} = 0$

substitúcia $x = 1+i$

$-700 + \frac{1300}{x} - \frac{100}{x^2} = 0 \quad / \cdot \frac{x^2}{-100}$

$7x^2 - 13x + 1 = 0$

$D = (-13)^2 - 4 \cdot 7 \cdot 1 = 141$

$D = 11,874$

$x_{1,2} = \frac{13 \pm 11,874}{2 \cdot 7} = \begin{cases} 1,7767 \in \langle 1, 2 \rangle \\ 0,0804 \notin \langle 1, 2 \rangle \end{cases}$

$x = 1+i \Rightarrow i = x - 1$

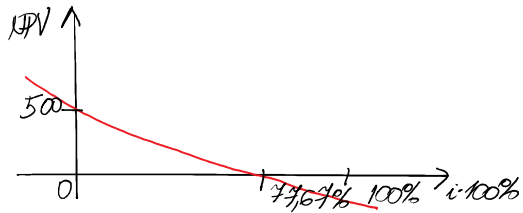
$i = 1,7767 - 1$

$i^* = 0,7767$

$IRR_B = 0,7767 \cdot 100\% = 77,67\%$

$NPV_B(0) = -700 + 1300 - 100 = 500$

$$NPV_B(0) = -700 + 1300 - 100 = 500$$



$$NPV_A(i) = NPV_B(i)$$

$$NPV_{A-B}(i) = 0$$

$$1000 - \frac{1700}{1+i} + \frac{700}{(1+i)^2} = 0$$

substituce $X = 1+i$

$$1000 - \frac{1700}{X} + \frac{700}{X^2} = 0 \quad | \cdot \frac{X^2}{100}$$

$$10X^2 - 17X + 7 = 0$$

$$D = (-17)^2 - 4 \cdot 10 \cdot 7 = 9$$

$$\sqrt{D} = 3$$

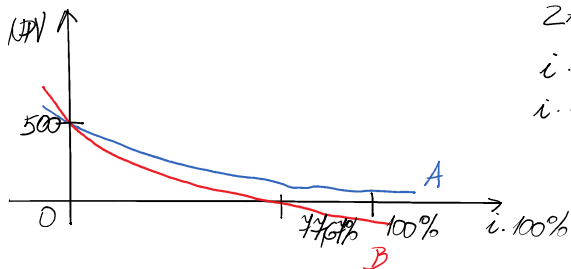
$$X_{1,2} = \frac{17 \pm 3}{2 \cdot 10} = \begin{cases} 1 \in \langle 1, 2 \rangle \\ 0,7 \notin \langle 1, 2 \rangle \end{cases}$$

$$X = 1+i \Rightarrow i = X - 1$$

$$i = 1 - 1$$

$$i^* = 0$$

$$IRR_{A-B} = 0 \cdot 100\% = 0\%$$



ZÁVĚR

$i \cdot 100\% \in \langle 0, 100\% \rangle$ JE VÝHODNEJŠÍ A

$i \cdot 100\% \in \langle 77,67\%; 100\% \rangle$ JE PŘIJATEČNÝ LEN A

11. TÝŽDENĚ NEBUDE PREDNÁŠKA

12. TÝŽDENĚ BUDE!