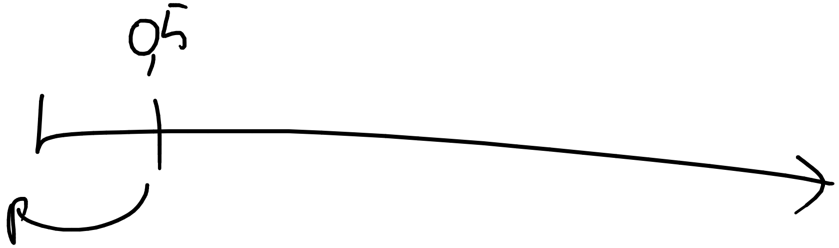
$$(1+i_1) = (1+i_2)^2 \qquad \boxed{i_2 = 0{,}0344}$$



NPV $(i_2 ;\ )$ = price

$$D = \sum_{k=1}^{m} t_k \cdot p_k \Rightarrow \frac{e_k (1+i)^{-k}}{\text{PRICE}}$$

$$D = 0{,}5 \left[\frac{70(1+0{,}07)^{-0{,}5}}{P} \right] + 1 \left[\frac{70(1+0{,}07)^{-1}}{P} \right] + \ldots$$

$$\ldots + 5 \left[\frac{1070(1+0{,}07)^{-5}}{P} \right] =$$

$$\underbrace{f(x) - f(x_0)}_{\Delta P} = \underbrace{f'(x_0)}\,\underbrace{(x - x_0)}_{\Delta r} + \frac{1}{2}\underbrace{f''(x_0)}\,\underbrace{(x - x_0)^2}_{\Delta r^2}$$

$$=$$

$$\boxed{P = \sum_i c_k (1+r)^{-k}}$$

$$f'(x_0) =$$

$$\frac{\partial P}{\partial r} = \sum_i -k(1+r)^{-k-1} \cdot c_k = \frac{\sum_i -k(1+r)^{-k} c_k}{(1+r)\,P}\, P$$

$$= -\frac{D}{1+r} \cdot P$$

$$D$$

$$f(x) - f(x_0) = f'(x_0)\,(x - x_0)$$

$$\Delta P = -\frac{D}{1+r} \cdot P \cdot \Delta r$$

1° ORDER APPROXIMATION

$$f''(x_0) = \left[\sum -k \, c_k \, (1+r)^{-k-1} \right]'$$

$$= \sum (-k)(-k-1) \cdot c_k \, (1+r)^{-k-2}$$

$$= \frac{\sum k(k+1) \cdot c_k \, (1+r)^{-k}}{(1+r)^2} \, \frac{P}{P} =: C$$

$$D = \sum k \cdot p_k \qquad C = \sum k(k+1) \cdot p_k$$

$$f(x)-f(x_0) = f'(x_0)(x-x_0) + \frac{1}{2} f''(x_0)(x-x_0)^2$$

$$\Delta P = \boxed{-\frac{D}{1+r}\cdot P}\,\Delta r + \frac{1}{2}\boxed{\frac{C\cdot P}{(1+r)^2}}\cdot \Delta r^2$$

$$\frac{D}{1+r} = \boxed{DM} = \text{modified DURATION}$$

MDURATION (; ; ;)

$$\frac{\Delta P}{P} \simeq -DM \cdot \Delta r$$