Hw1.1

Thursday, September 12, 2024 7:19 PM

Task 1

Principal : $20 000

Period : 60 months

Fixed interest : 10%

Monthly rate : 0,1 / 12

$$PV = \frac{M}{(1+r)}$$

This is only for a single period, I need the entire period,

$$PV = M\left(\frac{1}{(1+r)^1} + \frac{1}{(1+r)^2} \cdots \frac{1}{(1+r)^n}\right)$$

This is a geometric series

$$S_n = \left(\frac{1}{(1+r)^1} + \frac{1}{(1+r)^2} \cdots \frac{1}{(1+r)^n}\right) = a\frac{1-x^n}{1-x} \quad \text{where } a = \frac{1}{1+r},\ x = \frac{1}{1+r}$$

$$PV = M S_n = M a \cdot \frac{1-x^n}{1-x} = M\left(\frac{1}{1+r} \cdot \frac{1-\left(\frac{1}{1+r}\right)^n}{1-\frac{1}{1+r}}\right) = M\frac{1-(1+r)^{-n}}{r}$$

$$PV = \frac{M(1-(1+r)^{-n}}{r}$$

$$M = \frac{PV \cdot r}{(1-(1+r)^{-n}}$$

$$= \frac{20\ 000 \cdot 0,1/12}{(1-(1+(\frac{0,1}{12})^{-60}} = 424,94$$

The monthly payment is $ 424,94