Grading: Problem 2

September 29, 2019

For $N = 120$, $r = 0.02$, $m = 12$, calculate the future value to be paid A amount at the beginning of the each year:

$$FV = \sum_{i=1}^{N} \left(1 + \frac{r}{m}\right)^i = \left(1 + \frac{r}{m}\right) \frac{\left(1 + \frac{r}{m}\right)^N - 1}{\frac{r}{m}} = x \frac{x^N - 1}{x - 1}, \tag{1}$$

for $x = 1 + r/m$ and FV is divided by A. This is the money which is saved during 120 months. Now, 1500\$ will be withdrawn at the beggining of the each following 360 months. For $M = 360$, the present value can computed as

$$PV = \sum_{i=0}^{M-1} 1500 \left(1 + \frac{r}{m}\right)^{-i} = 1500 \frac{1 - \left(1 + \frac{r}{m}\right)^{-M}}{1 - \left(\frac{1}{1 + \frac{r}{m}}\right)} = 1500 \frac{1 - x^{-M}}{1 - \frac{1}{x}}. \tag{2}$$

for $x = 1 + r/m$. Hence, the future and the present value must be equal to each other and A can be computed as

$$A = \frac{PV}{FV} = 3057.44 \tag{3}$$

Explanation: There is a mistake in the formulation of PV. (-0.5)
Given point: 3.5