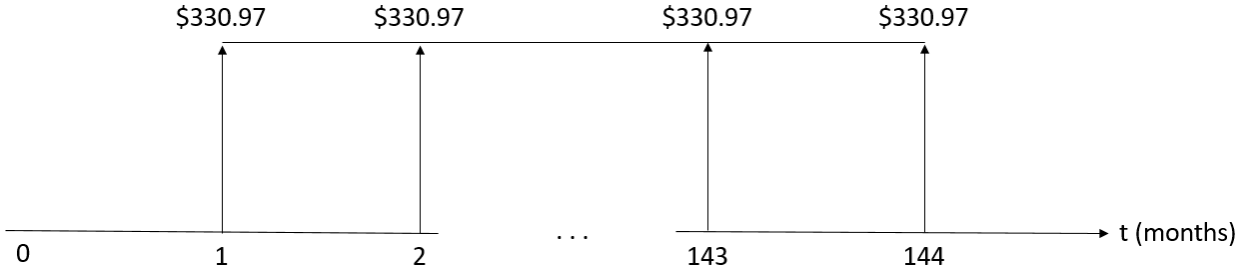
## 1 Question 1




$$r = 12\%$$

$$i = \frac{r}{m} = \frac{12\%}{12} = {}^{1\%}/_{month} = 0.01$$

$$n = 12\ years = 144\ months$$

$$F = (21{,}000)(4) + (1{,}800)(12) = 105{,}600$$

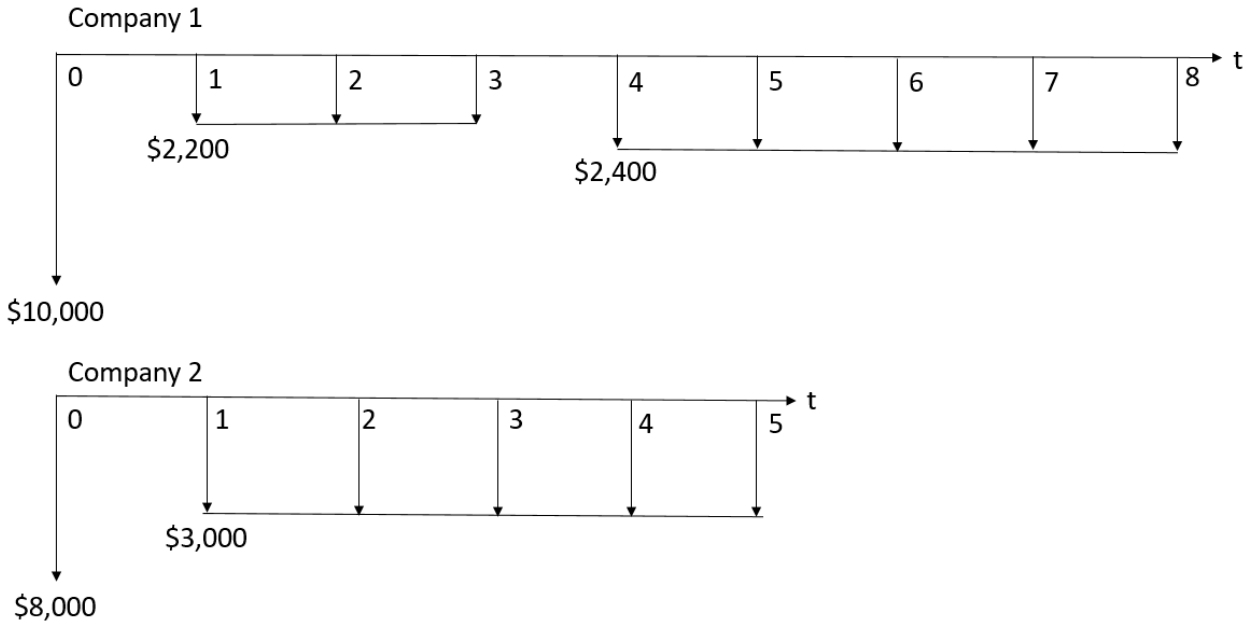
$$F = A({}^{F}/_{A}, 1\%, 144)$$

$$A = \frac{F}{((1+i)^{n}-1)/_{i}} = \frac{105{,}600}{((1+0.01)^{144}-1)/_{0.01}}$$

$$A = \$330.97$$

He should save $330.97 at the end of each month to cover the tuition and housing.

## 2 Question 2




$$r = 15\%$$

$$i = \frac{r}{m} = \frac{15\%}{12} = 1.25\%$$

$$LCM = 40$$

$$PW_1 = 10{,}000 + 2{,}200\left(\frac{1.0125^{36} - 1}{0.0125(1.0125)^{36}}\right) + 2400\left(\frac{1.0125^{60} - 1}{0.0125(1.0125)^{60}}\right)\left(\frac{1}{1.0125^{36}}\right)$$

$$PW_1 = 137{,}968.68$$

$$A_1 = 137{,}968.68\left(\frac{0.0125(1.0125)^{96}}{1.0125^{96} - 1}\right) = 2{,}475.90$$

$$P_1 = 2{,}475.90\left(\frac{1.0125^{480} - 1}{0.0125(1.0125)^{480}}\right) = \$197{,}562.43$$

$$PW_2 = 8{,}000 + 3{,}000\left(\frac{1.0125^{60} - 1}{0.0125(1.0125)^{60}}\right)$$

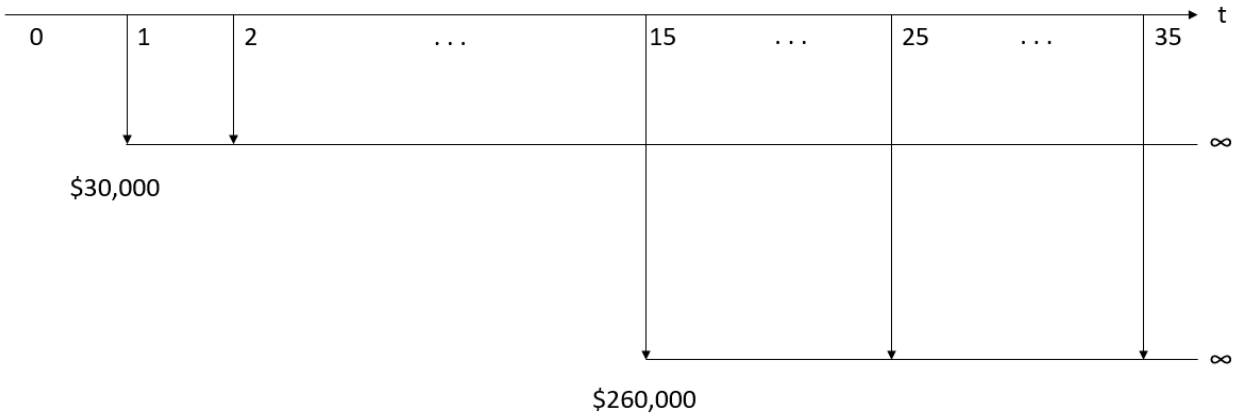
$$PW_2 = 134{,}103.78$$

$$A_2 = 134{,}103.78\left(\frac{0.0125(1.0125)^{60}}{1.0125^{60} - 1}\right) = 3{,}190.32$$

$$P_2 = 3{,}190.32\left(\frac{1.0125^{480} - 1}{0.0125(1.0125)^{480}}\right) = \$254{,}568.99$$

$P_1 < P_2$, so Company 1 has the better offer.

## 3 Question 3




$$PW = \frac{30{,}000}{0.15} + 260{,}000\left(\frac{0.15}{1.15^{10}-1}\right)\left(\frac{1}{0.15}\right)\left(\frac{1}{1.15^{5}}\right)$$

$$PW = \$242{,}444.10$$

The present worth of this maintenance plan is $242,444.10.

## 4 Question 4

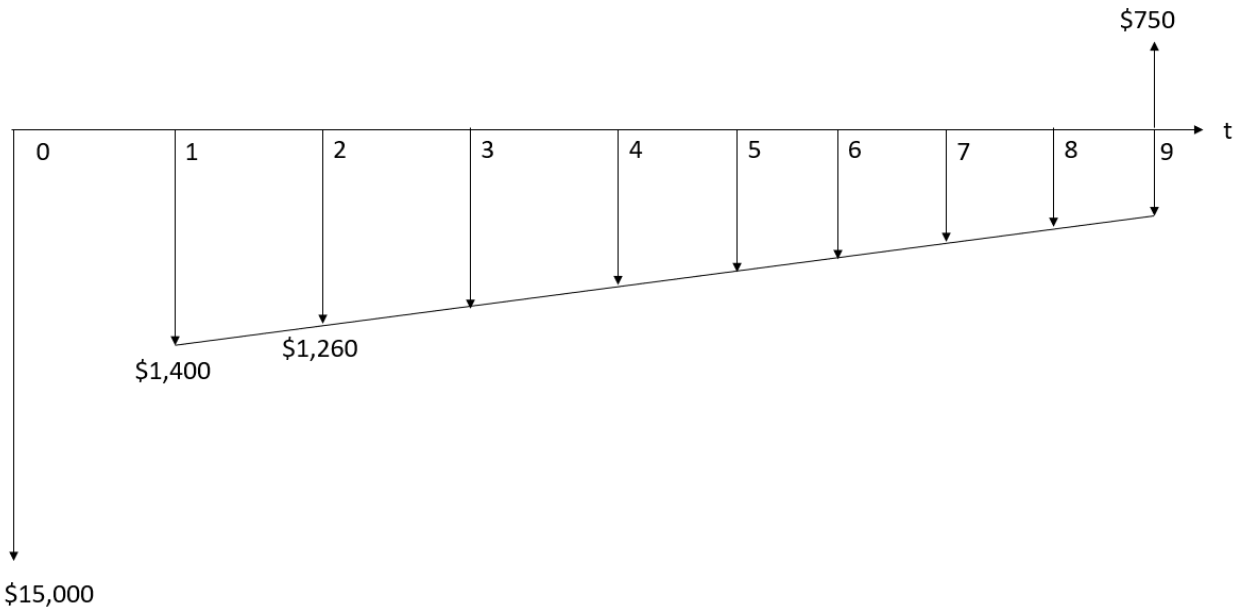

$$i = {}^{10\%}/_{year} = {}^{0.833\%}/_{month}$$

$$PW_1 = 0\ (no\ costs)$$

$$PW_2 = 1000 - 100\left(\frac{1.00833^{12} - 1}{0.00833(1.00833)^{12}}\right) = -\$137.47$$

Option 1 is more beneficial for him at the end of the year because he does not need to spend any money, unlike in Option 2, where he needs to spend $137.47.

## 5 Question 5




$$i = {}^{12\%}/_{year}$$

$$g = -0.1\ (10\%\ decrease\ per\ year)$$

$$i^o = \frac{1 + 0.12}{1 - 0.1} - 1$$

$$i^o = 0.2444$$

$$PW = -15{,}000 + \frac{750}{(1 + 0.12)^9} - 1{,}400\left(\frac{(1 + 0.2444)^9 - 1}{(0.2444)(1.2444)^9}\right)\left(\frac{1}{1 - 0.1}\right)$$

$$PW = -\$20{,}204.84$$

The present worth of purchase and maintenance cost with an interest rate of 12% is $-\$20{,}204.84$.