Topic: Deferred Annuities

Carolyn borrows 30,000 to buy a car. The loan has deferred payments. Under the loan, Carolyn will make 60 payments. However, the first payment that Carolyn will make will be at the end of the fourth month.

The loan has an interest rate of 9% compounded monthly.

Determine the amount of Carolyn's loan payment.

Solution:

Payments are monthly so we need $\frac{i^{(12)}}{12} = \frac{0.09}{12} = 0.0075$

$$30,000 = v^3 Q a_{\overline{60}|}$$

It is v^3 because $Qa_{\overline{60}|}$ is the value one period before the first payment so it is the value at time 3.

$$30,000 = (1.0075)^{-3}(Q)\left(\frac{1-(1.0075)^{-60}}{0.0075}\right)$$

$$Q = \frac{30,000}{(1.0075)^{-3}\left(\frac{1-(1.0075)^{-60}}{0.0075}\right)} = 636.87$$

Krystian borrows 30,000 to buy a new car. The loan is a 54 month loan. There are no payments made at the end of the first six months. This deferral period is followed by 48 payments of Q with the first payment of Q made at the end of the seventh month and the last payment made at the end of the 54th month.

The interest rate on the loan is an annual effective interest rate of 6%.

Determine Q .

Solution:

$$i = 0.06 ==> \frac{i^{(12)}}{12} = (1.06)^{1/12} - 1 = 0.004867551$$

$$30,000 = Qv^6 a_{\overline{48|}} = Q(1.004867551)^{-6}\left(\frac{1-(1.004867551)^{-48}}{0.004867551}\right)$$

$$30,000 = Q(41.48626355)$$

$$Q = \frac{30,000}{41.48626355} = 723.13$$