Answer on Question #76455 – Math – Financial Math

Question

Having earned a bonus at his work, Rick placed the money in an investment earning 6.86% compounded monthly. He withdrew $370 at the end of every month for the next 4 years.

(a) What was the amount of the bonus?

(b) If he made all of the withdrawals as planned, how much interest was paid?

Solution

a. Assume that x was the amount of the bonus.

In first month Rick saved $x+x*0.0686=x*(1+0.0686)= x*1.0686$

In second month : $(x*1.0686-370) *1.0686=x*1.0686^2-370*1.0686$

In third month : $(x*1.0686^2-370*1.0686 -370)* 1.0686 = x*1.0686^3-370 *1.0686^2-370*1.0686= x*1.0686^3-370*(1.0686^2+1.0686)$

In n month $x*1.0686^n-370*\sum_{i=1}^{n-1}1.0686^i$

In this way, in 4 year (48 month) Rick saved: $x*1.0686^{48} -370*\sum_{i=1}^{47}1.0686^i =0.$

We use the formula to find the sum of the terms of a geometric progression:

$1+g+g^2+...+g^n=b1 * \frac{(g^n -1)}{g-1}$, где g – attitude of members, b1 – first member.

Then $\sum_{i=1}^{47}1.0686^i = 1.0686* \frac{(1.0686^{47} -1)}{1.0686-1}=336.61.$

$X=\frac{370*336.61}{1.0686^{48}}=5,155$ dollars.

b. Rick placed $5,155. And Rick got 370*48 = $17,760. So $17,760-$5,155=$12,605 is interest.

Answer:

a. $5,155.

b. $12,605