Bonus 2

November 1, 2011

1 Convert Interest Rate

The interest of 5%(1) is given to us, but must be converted to a convertible montly rate, because we are making monthly deposits. Setting up using the formula below will get us this interest rate.

$$(1+i)^{12} = (1+0.05)^{1}$$

Thus i is equal to.

$$i = (1.05)^{1/12} - 1$$

Now Multiply by 12 to get the convertible monthly percentage.

$$i = .407\% * 12$$
$$i = 4.89(12)\%$$

2 Find Full Number of Monthly Payments

We know that the future value, S, is \$20000 and will be made from monthly deposits,R, of \$500 and an interest rate of 4.89%(12). Now we must solve for n

$$S = R\frac{(1+i)^n - 1}{i}$$

$$\$20000 = \$500\frac{(1+\frac{\frac{4.89(12)}{12})^n - 1}{\frac{4.89(12)}{12}}}$$

Using Wolfram Alpha we get n = 37.13 Rounding down the number we get from n will give us our full monthly payments.

$$n = RoundDown(37.13)$$

We find that we make 37 full montly payments

$$n = 37$$

3 Find Amount of Remaining Partial Payment

We will now use the annuity due formula in order to account for all monthly payments and their interest at the time of the partial payment, which we will represent with x. By subtracting the annuity due from the future value we will get the remaining partial payment, .

$$S = R\frac{(1+i)^n - 1}{i}(1+i) + x$$

$$\$20000 = \$500\frac{(1+\frac{\frac{4.89(12)}{12})^n - 1}{\frac{4.89(12)}{12}}}(1+\frac{4.89(12)}{12}) + x$$

After solving through we get

$$x = \$20000 - \$19923.78$$

$$x = \$76.22$$