MATH 373
Quiz 3
Fall 2018
October 18, 2018

1. Ram invests 5000 at the beginning of each year into Fund A for 25 years. Fund A earns an annual effective interest rate of 10%. Each year, Ram removes the interest earned from Fund A and deposits it into Fund B which earns an annual interest rate of 8%.

   Calculate the total amount (in both Funds) that Ram will have after 25 years.

   Solution:

   $$\text{Fund A } = (25)(5000) = 125,000$$

   Fund A earns 500 of interest the first year, 1000 of interest the second year, etc.

   $$\text{Fund B} = \left[500 a_{\overline{25}|0.08} + \frac{500}{0.08}\left(a_{\overline{25}|0.08} - 25(1.08)^{-25} \right) \right](1.08)^{25}$$

   $$= \left[500\left(\frac{1-(1.08)^{-25}}{0.08} \right) + \frac{500}{0.08}\left(\left(\frac{1-(1.08)^{-25}}{0.08} \right) - 25(1.08)^{-25} \right) \right](1.08)^{25} = 337,215.09$$

   $$\text{Total = Fund A + Fund B } = 125,000.00 + 337,215.04 = 462,215.09$$

2. Jacque borrows 100,000 and is repaying it with annual payments of 9000 plus a balloon payment. The annual effective interest rate on the loan is 5%.

   Calculate the balloon payment.

   Solution:

   $PV = 100,000$

   $PMT = -9000$

   $I/Y = 5$

   $CPT\ N = 16.62$

   $2nd\ Amort$

   $P1 = 1$

   $P2 = 16$

   $Bal = 5370.03$

   $Ballon = 9000 + 5370.03 = 14,370.03$

3. Xue is receiving a scholarship from Purdue that pays monthly payments at the beginning of each month for 48 months. The first payment is 1000. The second payment is (1000)(1.01). The third payment is $(1000)(1.01)^2$. The payments continue in the same pattern with each payment being 1.01 times the prior payment.

   Using an interest rate of 6% compounded monthly, calculate the present value of Xue's scholarship.

   Solution:

$$PV = 1000 + 1000(1.01)(1.005)^{-1} + \ldots + 1000(1.01)^{47}(1.005)^{-47}$$

$$= \frac{1000 - 1000(1.01)^{48}(1.005)^{-48}}{1 - (1.01)(1.005)^{-1}} = 54,065.10$$