MATH 373
Quiz 2
Fall 2019
September 19, 2019

1. Alan loans Evan 12,000 today. Evan agrees to repay the loan with three annual payments of 4500.

   Alan reinvests each payment at an annual effective interest rate of 8%.

   Determine Alan's return on the loan taking into account reinvestment.

   Solution:

   $$12,000(1+i)^3 = 4500(1.08)^2 + 4500(1.08) + 4500 = 14,608.80$$

   $$(1+i)^3 = 1.2174$$

   $$i = (1.2174)^{1/3} - 1 = 0.06777$$

2. Brenna invests money in the Mills Fund for two years. She wants to approximate her annual dollar weighted return over those two years.

   Brenna initially invests 10,000 into the Fund. At the end of 5 months, Brenna has 12,000 and withdraws 4800 to buy a used car. At the end of 17 months, Brenna has 7500 and invests another 3600 in the Fund. After 24 months, Brenna has 12,000.

   Estimate Brenna's annual dollar weighted rate using the simple interest method that we learned in class.

   Solution:

   $$A + C + I = B \Longrightarrow 10,000 + (-4800 + 3600) + I = 12,000$$

   $$I = 3200$$

   $$j = \frac{3200}{10,000 - 4800\left(1 - \dfrac{5}{24}\right) + 3600\left(1 - \dfrac{17}{24}\right)} = 0.44137931$$

   $$1 + i = (1 + j)^{1/T} = (1.44137931)^{1/2} = 1.2006 \Longrightarrow Answer = 0.2006$$

3. Seth borrows 1000 to be repaid at an annual interest rate of 7.2%. Seth will make payments of 2P at time 3 and P at time 5.

Determine P.

Solution:

$$1000 = 2P(1.072)^{-3} + P(1.072)^{-5}$$

$$P = \frac{1000}{2(1.072)^{-3} + (1.072)^{-5}} = 429.21$$

OR

$$1000(1.072)^5 = 2P(1.072)^2 + P$$

$$P = \frac{1000(1.072)^5}{2(1.072)^2 + 1} = 429.21$$