MATH 373
Quiz 5
Spring 2019
April 11, 2019

1. Jackson buys the common stock of The Jones Company. The Jones Company is rapidly growing and its dividends are expected to increase into the future. The dividends are payable quarterly. The first dividend payable in two months and is expected to be 1.00. The next dividend is payable in 5 months and is expected to be 1.10. The dividends will continue to increase with each dividend being 0.10 greater than the previous dividend.

   Jackson wants to earn a yield of 10% compounded quarterly.

   Using the dividend discount method, determine the price that Jackson should pay for the stock of The Jones Company.

   Solution:

   Dividends are quarterly so we need $\frac{i^{(4)}}{4} = \frac{0.10}{4} = 0.025.$

   Payments increase arithmetically so we need P&Q.

   $$PV = \left(\frac{1.00}{0.025} + \frac{0.10}{(0.025)^2} \right)(1.025)^{1/3} = 201.65$$

   The $(1.025)^{1/3}$ is because the next payment is in 2 months.

2. Mattheos buys the preferred stock of Mercer Corporation. The preferred stock pays quarterly dividends. The next dividend paid later today will be 8.00. All future dividends are expected to be 8.00.

   Mattheos expects an annual effective yield on the preferred stock of 12%.

   Using the dividend discount method, calculate the price that Mattheos should pay for the preferred stock.

   Solution:

   The dividends are level with the next dividend paid later today. Therefore, we use the formula for a perpetuity due. Dividends are quarterly to we need $\frac{i^{(4)}}{4}$. We are given *i*.

$$(1+i)=\left(1+\frac{i^{(4)}}{4}\right)^4 \implies \frac{i^{(4)}}{4}=(1.12)^{0.25}-1=0.028737345$$

$$PV=\left(\frac{8}{0.028737345}\right)(1.028737345)=286.38$$

3. You are given the following spot interest rate curve:

t	r_t
0.25	0.030
0.50	0.035
0.75	0.039
1.00	0.042
1.25	0.045
1.50	0.047
1.75	0.049
2.00	0.050

Using the above spot interest rates, calculate the present value of an annuity immediate with three semi-annual payments. The first payment is 1000 in six months. The second payment is 2000 in one year. The final payment is 3000 in 18 months.

Solution:

$$PV = 1000(1+r_{0.5})^{-0.5} + 2000(1+r_1)^{-1} + 1000(1+r_{1.5})^{-1.5}$$

$$= 1000(1.035)^{-0.5} + 2000(1.042)^{-1} + 3000(1.047)^{-1.5}$$

$$= 5702.61$$