GOODMAN SCHOOL OF BUSINESS - BROCK UNIVERSITY
SOLUTION MIDTERM EXAMINATION 1

Course: FNCE 2P91 – SECTION 2 – FALL 2015
Instructor: M. A. Ayadi

Question 1. (35 marks)

A. Circle the correct answer.

1. The secondary market is:
A. the market for the original sale of securities by governments and corporations.
B. the market in which dealers buy and sell for themselves, at their own risk.
C. a market which has no central location.
D. the market in which securities are bought and sold after original sale.

2. The agency problem is best defined as a conflict of interest between a firm's:
A. stockholders and the firm's debtors.
B. various managers.
C. managers and the firm's employees.
D. stockholders and the firm's managers.

3. The primary goal of financial management is to maximize the:
A. Growth rate of a firm.
B. Compensation of the corporate officers.
C. Current value of each share of outstanding stock.
D. Number of shares of common stock outstanding.

4. Money markets would include which of the following securities?
A. Common stock and corporate bonds.
B. Treasury bills and commercial paper.
C. Certificates of deposit and preferred stock.
D. All of these.

5. One of the major disadvantages of a sole proprietorship is
A. that there is unlimited liability to the owner.
B. the simplicity of decision making.
C. low organizational costs.
D. low operating costs.

6. A corporation is
A. owned by stockholders who enjoy the privilege of limited liability.
B. easily divisible between owners.
C. a separate legal entity with perpetual life.
D. all of these.

7. When a corporation uses the financial markets to raise additional (not new) funds, the sale of securities is made in the
A. primary market.
B. secondary market.
C. on-line market.
D. treasury market.

8. A bond which has a yield to maturity less than its coupon interest rate will sell for a price
A. below par.
B. at par.
C. above par.
D. what is equal to the face value of the bond plus the value of all interest payments.

9. As the discount rate becomes higher and higher, the future value of inflows approaches
A. 0
B. minus infinity
C. plus infinity
D. need more information

10. As the interest rate increases, the present value of a perpetuity where the first payment is to be received at the end of a fixed period
A. increases.
B. decreases.
C. remains the same.
D. Not enough information to tell.

B.

1. What rate, compounded quarterly, is equivalent to 18% compounded monthly? (4 marks)

$$\left(1+\frac{r}{4}\right)^4 = \left(1+\frac{18\%}{12}\right)^{12}$$

$$\left(1+\frac{r}{4}\right) = (1+1.5\%)^3 = 1.045678$$

$$\Rightarrow \frac{r}{4} = 1.045678 - 1 = 0.045678$$

$$\Rightarrow r = 18.27\%$$

2. What rate, continuously compounded, is equivalent to 12% compounded semi-annually? (4 marks)

$$e^r = \left(1+\frac{12\%}{2}\right)^2 = (1+6\%)^2 = 1.1236$$

$$\Rightarrow r = \ln(1.1236) = 11.65\%$$

3. Find an effective rate (EAR) that is equivalent to a quarterly compounded rate of 8%? (4 marks)

$$1 + EAR = \left(1 + \frac{8\%}{4}\right)^4 = (1 + 2\%)^4 = 1.082432$$

$$\Rightarrow EAR = 8.24\%$$

4. Bryan invests $3,750 in an account that pays 12% simple interest. How much money will he have at the end of five years? (4 marks)

$$FV = 3{,}750 \times (1 + 5 \times 12\%) = \$6{,}000$$

C.

1. What is the present value of $1,500 received at the beginning of each year for 8 years if the interest rate is 14% compounded yearly? (5 marks)

$$PV = 1{,}500 \left[\frac{1 - (1+14\%)^{-8}}{14\%} \right] (1+14\%)$$

$$= \$7{,}932.457$$

2. What is the future value if the $450 is received at the end of each month for 3 years and the interest rate is 12% compounded monthly? (4 marks)

$$FV = 450\left[\frac{\left(1+\frac{12\%}{12}\right)^{3\times 12}-1}{\frac{12\%}{12}}\right]$$

$$= \$19,384.595$$

Question 2. (35 marks)

A. You have just joined a new Technology company TOXI. They've offered you two different salary packages. You can have $60,000 at the end of each year for the next three years, or you can have $12,000 at the end of each quarter period for the next three years along with a $15,000 signing bonus today. If the interest rate available to you is 9% compounded quarterly, which package do you prefer? (Draw the time line).

$$PV(\text{package 1}) = 60,000 \times \left[\frac{1-(1+EAR)^{-3}}{EAR}\right]$$

$$1+EAR = \left(1+\frac{9\%}{4}\right)^4 \Rightarrow EAR = 9.3083\%$$

$$PV(\text{package 1}) = \$151,047$$

$$PV(\text{package 2}) = 15,000 + 12,000\left[\frac{1-\left(1+\frac{9\%}{4}\right)^{-4\times 3}}{\frac{9\%}{4}}\right]$$

$$= \$139,977.3$$

$PV_1 > PV_2 \Rightarrow$ I would prefer package 1, since it has a higher PV.

B. Consider a mortgage on a house valued at $400,000 with an interest rate of 6% compounded semi-annually, for a period of 15 years. Assume a 25% down-payment and monthly payments.

1. Find the monthly payment.
2. Calculate the balance of the mortgage after 10 years.

1) Mortgage amount $= (1-25\%)\ 400{,}000 = \$300{,}000$

$$\left(1+\frac{6\%}{2}\right)^2 = \left(1+\frac{r}{12}\right)^{12} \Rightarrow (1+3\%) = \left(1+\frac{r}{12}\right)^6$$

$$\Rightarrow \frac{r}{12} = 0.004939$$

$$MP = \frac{300{,}000}{APVF\left(\frac{r}{12}, 15\times 12\right)} = \$2{,}519.65$$

$$APVF\left(\frac{r}{12}, 180\right) = \frac{1-\left(1+\frac{r}{12}\right)^{-180}}{\frac{r}{12}}$$

2) Balance $= MP \times APVF\left(\frac{r}{12}, 5\times 12\right)$

$$= 2{,}519.65 \times \left[\frac{1-\left(1+\frac{r}{12}\right)^{-60}}{\frac{r}{12}}\right]$$

$$= \$130{,}561.4$$

Question 3. (30 marks)

A. Vertox Inc. has an outstanding issue of $1000-par-value bonds with an 8% coupon interest rate. The issue pays interest semi-annually and has 10 years remaining to its maturity date.

1. If bonds of similar risk are currently earning 12% rate of return (YTM), how much should Vertox Inc.'s bond sell for today?

2. If required return (YTM) were at 6% instead of 12%, what would be the current value of Vertox Inc. bond? Contrast this finding with your findings in part 1 and discuss.

B. A zero-coupon bond has a price of $845 and 9 years until it fully matures. What is the yield to maturity of this bond if the face value is $1,000? What will be the price if it has only 7 years to maturity?

1) $P_0 = \frac{80}{2} \times APVF\left(\frac{12\%}{2}, 20\right) + 1000 \times PVF\left(\frac{12\%}{2}, 20\right)$

$= 458.79 + 311.80$

$= \$770.60$

2) $YTM = 6\%$.

$P_0 = \frac{80}{2} \times APVF\left(\frac{6\%}{2}, 20\right) + 1000 \times PVF\left(\frac{6\%}{2}, 20\right)$

$= \$1148.78$

as r↑, P_0↓ & r↓, P_0↑

There is an inverse relationship between interest rates & bond prices ⇒ Interest rate risk.

B) $YTM = \left(\frac{F}{P}\right)^{\frac{1}{n}} - 1 = \left(\frac{1000}{845}\right)^{\frac{1}{9}} - 1 = 1.89\%$

$P_0 = \frac{F}{(1+YTM)^7} = \frac{1000}{(1+1.89\%)^7} = \$877.22$