Darasirikul Varis
student id: 3035754210

IELM7018 Assignment 1

1. (10 marks) Mary has just arranged to purchase a $450,000 vacation home in the Hawaii with a 20 percent down payment. The mortgage has a 7.5 percent stated annual interest rate, compounded monthly, and calls for equal monthly payments over the next 30 years. Her first payment will be due one month from now. However, the mortgage has an eight-year balloon payment, meaning that the balance of the loan must be paid off at the end of year 8. There were no other transaction costs or finance charges. How much will Audrey's balloon payment be in eight years?

Total Payment:	450,000
Down Payment 20%:	450,000 * (20/100) = 90,000
Actual Payment:	450,000 - 90,000 = 360,000
Annual interest rate	7.5% (compounded monthly)
Period	30 years
Payment per Month (Without interest)	360,000 / (30 * 12) = 1,000
Ballon Payment	= FV(r = 7.5% / 12, nper = 12 * 8, per month = 1,000 , pv = -360,000)
	= **$130,340.41**

2. (10 marks) You have your choice of two investment accounts. Investment A is a 15-year annuity that features end-of-month $1,200 payments and has an interest rate of 9.8 percent compounded monthly. Investment B is a 9 percent continuously compounded lump-sum investment, also good for 15 years. How much money would you need to invest in B today for it to be worth as much as Investment A 15 years from now?

Investment A	Investment B
15 Year annuity	15 Years
1,200 monthly payments	
9.8% interest	9% interest

PV of Investment A = 1200 * ((1/0.098) - (1 / (0.098 * ((1 + 0.098) ^ (12 * 15)))))

= $12,244.89736

PV of Investment B

$12,244.89736 = Payment per month * ((1/0.09) - (1 / (0.09 * ((1 + 0.09) ^ (12 * 15)))))

Payment per month = 12,244.89736 / ((1/0.09) - (1 / (0.09 * ((1 + 0.09) ^ (12 * 15)))))

= 1102.25

Total Payment = 1102.25 per month * 12 * 25

= **$330,675**

To make invest in B today to be worth as much as Investment A 15 years

3. (10 marks) A project has an initial cost of I, has a required return of R, and pays C annually for N years.

(a) (5 marks) Find C in terms of I and N such that the project has a payback period just equal to its life.

C = I/N

(b) (5 marks) Find C in terms of I,N, and R such that this is a profitable project according to the NPV decision rule.

NPV = ∑ C / (1 + R) ^ N - I

PVIFA = (1 - (1 + R) ^ -N) / R

So if **C > I / (PVIFA at R%, N)** then this is a **profitable** project

4. (10 marks) Suppose you are offered $8,000 today but must make the following payments:

Year	Cash Flows ($)
0	8,000
1	-4,400
2	-2,700
3	-1,900
4	-1,500

(a) (2.5 marks) What is the IRR of this offer?
(b) (2.5 marks) If the appropriate discount rate is 10 percent, should you accept this offer?
(c) (2.5 marks) If the appropriate discount rate is 20 percent, should you accept this offer?
(d) (2.5 marks) In (b) and (c), are the decisions under the NPV rule consistent with those of the IRR rule?

(a) IRR will make NPV = 0

0 = 8000
+ (-4,400 / 1 + IRR)
+ (-2,700 / (1 + IRR) ^ 2)
+ (-1,900 / (1 + IRR) ^ 3)
+ (-1,500 / (1 + IRR) ^ 4)

IRR = 0.14807
= **14.807 %**

(b) If rate = 10% , NPV = -683
NPV < 0 we should **not** accept this offer

(c) if rate = 20% , NPV = 635
NPV > 0 we should **accept** this offer

(d) Yes, because it is the same type and length of investment.

5. (10 marks) Apple Inc. has 6.5 percent coupon bonds on the market with 5 years to maturity. The bonds make semiannual payments and currently sell for 97 percent of par ($1000). What is the current yield on the bonds? The Yield to Maturity (YTM)? The effective annual rate (EAR)?

Rate	6.5%
Maturity	5 years
Payment	semi-annual
Current sell	970 (97 % of par 1000)

Yearly coupon = 0.065 * 1000

= 65

Current yield = 65 / 970

= 0.067

= **6.7%**

YTM = (65 + ((1000 - 970) / 5)) / ((1000 + 970) / 2)

= **7.2%**

EAR = ((1 + (0.072 / 2)) ^ 2) - 1

= **7.32%**

6. (10 marks) A 10-year bond provides a coupon of 5% per annum payable semiannually. Its price is 1060. What is the bond's yield? You may find Excel's Solver useful. (In general, a bond's face value is 1000)

Maturity	10 years
Rate	5%
Payment	semi-annual
Current Price	1060
Face value	1000

Yield = 0.05 * 1000 / 1060

= **4.71%**

7. (10 marks) FedEx Corp. has 10 percent coupon bonds making annual payments with a YTM of 7.32 percent. The current yield on these bonds is 7.42 percent. How many years do these bonds have left until they mature?

FV	1,000
Rate	10%
Payment	annual
YTM	7.32%
Current yield	7.42%

Annual payment = 1,000 * 0.1

= 100

Current Price = 100 / 0.0742

= 1,347

0.0732 (YTM) **=** (100 + ((1000 - 1347) / Year to Maturity)) / ((1000 + 1347) / 2)

0.0732 * 1173.5 = 100 + ((-347) / Year to Maturity)

Year to Maturity = **24.61 years**

8. (10 marks) McDonald's has the following dividend policy. The company has just paid a dividend of $7 per share and has announced that it will increase the dividend by $3.5 per share for each of the next five years, and then never pay another dividend. If you require an 14 percent return on the company's stock, how much will you pay for a share today?

Dividend 7 per share

NPV = 7 / (1 + 0.14) + 10.5 / (1 + 0.14) ^ 2 + 14 / (1 + 0.14)^3 + 17.5 / (1 + 0.14)^4 + 21 / (1 + 0.14) ^ 5

= **<u>44.937</u>** per a share

9. (10 marks) Huawei earned $7 million for the fiscal year ending yesterday. The firm also paid out 20 percent of its earnings as dividends yesterday. The firm will continue to pay out 20 percent of its earnings as annual, end-of-year dividends. The remaining 80 percent of earnings is retained by the company for use in projects. The company has 2 million shares of common stock outstanding. The current stock price is $92. The historical return on equity (ROE) of 11 percent is expected to continue in the future. What is the required rate of return on the stock?

Earn 7 Million
Dividends 20%
Plowback 80%
Stock 2 Million shares
Current Price 92
ROE 11%
Rate of Return ?

Growth = 0.8 * 0.11 = 0.088

DIV = Current dividend * (1+ Growth)

Rate of Return = (DIV / Current Price) + G

= ((((7,000,000 * 0.2) / 2,000,000) * (1 + 0.088)) / 98) + 0.088

= 0.0957

= **<u>9.57%</u>**

11. (10 marks) Suppose you bought an 8 percent coupon bond one year ago for $1,090. The bond sells for $1,056 today.
(a) (5 marks) Assuming a $1,000 face value, what was your total dollar return on this investment over the past year?

Coupon Return = 1000 * 0.08

= $80

Total = -1,090 + 1,056 + 80

= **$46**

(b) (5 marks) What was your total nominal rate of return on this investment over the past year?

Nominal rate = (1,056 - 1090) / 1,090

= **-3.12%**

12. (10 marks) Suppose the returns on long-term government bonds are normally distributed with mean 6.1% and standard deviation 9.4%. Based on the historical record,

Mean 6.1%
Deviation 9.4%

(a) (3 marks) What is the approximate probability that your return on these bonds will be less than –3.3 percent in a given year?

z = (-0.033 - 0.061) / 0.094

= **-1**

(b) (3 marks) What range of returns would you expect to see 95 percent of the time?

Expect to see 95% is mean plus or minus 2 standard deviation

Range of returns = 6.1% +- 2(9.4)

= **-12.7 to 24.9%**

(c) (4 marks) What range would you expect to see 99 percent of the time?

Expect to see 99% is mean plus or minus 3 standard deviation

Range of returns = 6.1% +- 3(9.4)

= **-22.1 to 34.3%**

13. (10 marks) You have $10,000 to invest in a stock portfolio. Your choices are stock X with an expected return of 16 percent and stock Y with an expected return of 10 percent. If your goal is to create a portfolio with an expected return of 12.9 percent, how much money will you invest in stock X? In stock Y?

Rx = 16%
Ry = 10%
Expected R = 12.9%

Weight for Stock X = x
Weight for Stock Y = 1 - x

0.129 = (0.16 * x) + (0.1 * (1-x))

x = 0.483

y = 1 - 0.483

= 0.517

Invest in Stock X = 10,000 * 0.483

= $**4,830**

Invest in Stock Y = 10,000 * 0.517

= $**5,170**

14. (10 marks) Suppose you observe the following situation:

Stock	Beta	Expected Return
A	1.4	0.150
B	0.9	0.115

Assume these securities are correctly priced. Based on the CAPM, what is the expected return on the market? What is the risk-free rate?

Expected Return's stock = Risk-free rate + Beta * (expected return on the market - Risk-free rate)

Stock A

0.150 = Rf + 1.4 * (Em - Rf)

Stock B

0.115 = Rf + 0.9 * (Em - Rf)

Stock A - Stock B

0.035 = 0.5(Em - Rf)

Em - Rf = 0.07

Add 0.07 to Stock A equation

0.150 = Rf + 1.4 * (0.07)

Risk-free rate = **<u>0.052</u>**

Expected return on the market

= 0.07 + 0.052

= 0.122

= **<u>12.2%</u>**

15. (10 marks) Suppose the risk-free rate is 4.8 percent and the market portfolio has an expected return of 11.4 percent. The market portfolio has a variance of .0429. Portfolio Z has a correlation coefficient with the market of .39 and a variance of .1783. According to the capital asset pricing model, what is the expected return on portfolio Z?

Market

Risk-free rate	4.8%
Expected return	11.4%
Variance	0.0429
Correlation coefficient	0.39

Portfolio Z

Variance	0.1783

Standard deviation of Market = √0.0429
= 0.2071

Standard deviation of Z = √0.1783
= 0.4222

Beta of Z = 0.39 * 0.4222 / 0.2071
= 0.795

Expected return on portfolio Z = 0.048 + 0.795 * (0.114 - 0.048)

= 0.10047

= **<u>10.047%</u>**