NAME:_____

Section:_____

SCHOOL OF MANAGEMENT
YALE UNIVERSITY

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MGT 890
Valuation and Investment

Fall 1999

EXAM

INSTRUCTIONS:

This is a closed-book exam, and you are **not** allowed to use any "cheat sheets". A formula sheet is included on the last page of the exam. You have 180 minutes to complete all seven questions (**180 points**). *Keep your answers to the point and clearly state the reasoning behind your conclusions.* Your analysis will count as much as your conclusion. Please write your answers on the exam in the space provided after each question. The blank back side of each page can be used as scrap paper. Good luck!

Question 1 (10 points)
You have the following information

Year	Cash Flow	*Spot* interest rate for t-period investments
1	C_1	i_1
2	C_2	i_2
3	C_3	i_3

Write down the present value equation for the cash flows

Question 2 (15 points)

You have an annuity that pays $15 per year beginning in period 3, and ending in period 12 (a total of 10 periods).

(10) (a) If the interest rate equals 12% what is the annuity worth today?

(5) (b) Six months from today what will the annuity be worth?

Question 3 (30 points)

John has just invested his savings of $100,000 in two mutual funds. He put $60,000 in a fund that holds the SP500, and $40,000 in a fund that invests in stocks from emerging markets. Assuming the following normal distribution of returns

Fund	Expected Return	Standard Deviation
SP500	0.10	0.25
Emerging Markets	0.15	0.40

The correlation between the two funds is 0.30

(15) (a) What is John's portfolio expected to be worth at the end of the year?

(15) (b) What is the standard deviation of the portfolio return?

Question 4 (50 points)

Assume that if a firm pays out all its earnings as dividends, its earnings would never change. Suppose the firm's earnings per share for the next year are $9 and that its stock currently sells for $120 per share. The firm has a beta of 1.5. The expected return on the market is 8% and the risk free rate 4%.

(5) (a) What is the firm's required rate of return?

(10) (b) What is the net present value of the growth opportunities of the firm.?

Assume for the next 3 questions that the retention ratio (plowback ratio) is 1/3.

(10) (c) What is the growth rate of future earnings?

(5) (d) What return does the firm earn on its reinvested earnings (return on equity)?

(10) (e) What price do you expect the shares to sell for one year from today?

(10) (f) What would happen to the stock price if the firm were to announce an increase of its retention ratio (plowback ratio) and invest the additional capital in shares of IBM, which have a beta of 1.2?

Question 5 (30 points)

The following information is available to you regarding two bonds with *annual* coupons:

Bond	Coupon	Maturity (years)	Face Value	yield to maturity
A	5%	1	100	8%
B	6%	2	100	9%

(15) (a) Compute the prices of the two bonds. *Show your calculations*

(15) (b) What is the forward rate for the second year? *Show your calculations*

Question 6 (30 points)

You just became the parent of a baby girl. Since you went to an Ivy League School, it is only fair that she does the same eighteen years from today. Currently the .annual tuition for people starting a four year bachelor's program is $30,000 per year with the first payment today. The annual cost is expected to grow at the rate of inflation + .25% per year. The expected rate of inflation is 2% per year. The nominal interest rate is 8% per year.

(5) (a) What is the real interest rate in the economy?

(10) (b) What is the percentage change in the real cost of a four year degree between today and 18 years from now?

(15) (c) Suppose your current income is $100,000 (in period 1) and grows at the rate of inflation. What constant fraction of your income do you need to save each year, for eighteen years, in order to finance your daughter's education. Assume that tuition has to be paid at the beginning of each college year, so that the first tuition payment is due eighteen years from today.

Question 7 (15 points)

Suppose there is a stock which plots above the Security Market Line (expected return versus beta), what would happen to its price? *Explain fully*

Formula sheet

Present value of a dollar received t periods from today:

$$\frac{1}{(1+r)^t}$$

Present value of a perpetuity:

$$PV = \frac{C}{(1+r)} + \frac{C}{(1+r)^2} + \frac{C}{(1+r)^3} + \ldots = \frac{C}{r}$$

Present value of a growing perpetuity:

$$PV = \frac{C}{(1+r)} + \frac{C(1+g)}{(1+r)^2} + \frac{C(1+g)^2}{(1+r)^3} + \ldots = \frac{C}{r-g}$$

Present value of an annuity:

$$PV = \frac{C}{(1+r)} + \frac{C}{(1+r)^2} + \frac{C}{(1+r)^3} + \ldots + \frac{C}{(1+r)^T} = C[\frac{1}{r} - \frac{1}{r(1+r)^T}]$$

Present value of a growing annuity:

$$PV = \frac{C}{(1+r)} + \frac{C(1+g)}{(1+r)^2} + \frac{C(1+g)^2}{(1+r)^3} + \ldots + \frac{C(1+g)^{T-1}}{(1+r)^T} = C[\frac{1}{r-g} - \frac{1}{r-g} \times (\frac{1+g}{1+r})^T]$$

Roots of equation $ax^2+bx+c = 0$:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Manipulating covariances:

$$var(ax+by) = a^2 var(x) + b^2 var(y) + 2abcov(x,y) = a^2 var(x) + b^2 var(y) + 2abcor(x,y)std(x)std(y)$$

CAPM pricing equation:

$$E(R_i) = r_f + \beta_i [E(R_m) - r_f] \qquad \beta_i = \frac{cov(R_i, R_m)}{var(R_m)}$$