NBA 5420 – Investments and Portfolio Management
Problem Set 5 – Valuation

Problem 1:

Using the following data, find the expected rate of return for an investment in SBC Corporation.

SBC's dividend (for next year)	$ 1.13
SBC's price	22.60
Security analysts' expected long-term growth rate for SBC	6%

a. What rate of return (i.e. discount rate) does SBC promise using the Gordon Growth model? (Hint: re-arrange Gordon growth to get $E(r) = D_1/P_0 + g$)

b. If you thought you should get a 10 percent rate of return (i.e. discount rate) from SBC and agreed with the long-term growth forecasts, at what price should SBC sell (again, using the Gordon model)?

Problem 2:

Charles Freeman, portfolio manager for Windsor Fund, was considering the purchase of CISCO's common stock. Freeman believed that CISCO's earnings can grow at 20 percent per year over the next five years, after which the CISCO's earnings multiple will fall to a market multiple (i.e. CISCO's dividend and earnings growth rate will fall to the market's long-run growth rate, and its discount rate will equal the market's discount rate). At that point, CISCO will start paying dividends with the same payout ratio as the market (currently, it pays zero dividends). Freeman thinks that the risk involved for CISCO's shares is greater than that for the general market during its high-growth phase (next five years) and, therefore, the appropriate discount rate to be applied to CISCO's shares for the first 5 years should be 3 percentage points greater than the long-run return from the market.

- CISCO's earnings per share (current year) $0.70
- CISCO's current dividend payout ratio 0
- CISCO's current stock price $21
- P/E for S&P 500 20
- Dividend payout for S&P 500 30 %
- Anticipated long-run growth rate for earnings and dividends of the S&P 500 6½ %

Using the Gordon Growth valuation model, answer the following questions:

a. What is the market discount rate implied by the Gordon Growth formula? (Hint: $E(r_m) = (D_1/P_0)_m + g_m = (1 - b_m)(E_1/P_0)_m + g_m$, where 1-b is the market payout ratio.)

b. What is the proper value of CISCO implied by future dividends using the Gordon Growth formula? (You can either use a spreadsheet or calculate this with an exact formula.)

   Hint: Let r_c' and g_c' be the discount rate and the growth rate for CISCO for the next five years. Let r_c and g_c be the discount rate and the growth rate for CISCO after the fifth year.

   Because dividends are 0 for the first 5 years, the intrinsic value of CISCO is the following:

$$P_{c,0} = \frac{D_{c,6}}{(1+r_c')^5(1+r_c)} + \frac{D_{c,7}}{(1+r_c')^5(1+r_c)^2} + \frac{D_{c,8}}{(1+r_c')^5(1+r_c)^3} + \ldots$$

$$\text{Note that } D_{c,t} = (1-b_c) * E_{c,t} = (1-b_c) * E_{c,0} * (1+g_c')^5(1+g_c)^{t-5}$$

c. What growth rate is implied by CISCO's current price (assuming the same discount rates in part b)?

Problem 3:

Assume that the S&P 500 Stock Index is currently at a P/E multiple of 25 and has an expected dividend yield (D/P) of 1½ percent.

a. Use the Gordon Formula and estimate the rate of return for the S&P 500 using the historical rate of growth of dividends, which has been 6½ percent. (Hint: re-arrange Gordon growth to get $E(r) = D_1/P_0 + g$)

b. Estimate the rate of return for the S&P 500 at dividend growth rates of 5, 6, 7, 8, and 9 percent.

c. Assume that long-term AAA bonds yield 6 percent. If stocks should be priced to yield 5 percentage points more than long-term bonds, at what P/E should the S&P sell if the growth rate of dividends is 5, 6, 7, 8, 9, and 10 percent? (Do a separate calculation for each growth rate. Hint: first calculate the market payout ratio using the fact that D/P = 1.5% and P/E = 25. Then, use Gordon Growth.)

d. Now suppose that stocks should be priced to yield 2 percentage points more than long-term bonds, at what P/E should the S&P sell if the growth rate of dividends is 5, 6, 7, 8, 9, and 10 percent? (Do a separate calculation for each growth rate.)

e. On the basis of your calculations, do you agree with Robert Shiller who argued in his book, "Irrational Exuberance," that stocks are were wildly overpriced in 1999 when the market P/E ratio exceeded 40?

Problem 4:

Robert Stansky, the portfolio manager of the Magellan Fund, is trying to ascertain the worth of Amazon.com and whether it should be purchased for his portfolio. He is convinced that Amazon is an excellent company that would continue to benefit from the growth of e-commerce, but all the old valuation rules seem useless. One couldn't compute a P/E multiple because there were hardly any earnings. Price-to-sales ratios made no sense because the stock sells on expectations of future, not current, sales.

Stansky decided to value Amazon by estimating its worth 10 years from now and then discounting that value back to the present. He then made the following generous assumptions about Amazon's growth in the years ahead.

- Amazon's sales in ten years: $80B
- Amazon's net after-tax profit margin in ten years: 1 percent
- Number of shares outstanding in 2013: 400 million
- Appropriate P/E in ten years: 25 (assumes Amazon will get a market multiple)
- Appropriate discount rate between now and year 10: 15 percent (Amazon is riskier than the general market)

On the basis of these assumptions, how much per share should an investor be willing to pay for Amazon's common stock?

(Hint: first calculate earnings per share in ten years. Then, price the stock in ten years using the appropriate multiple. Finally, discount the ten-years-ahead price to the present.)