Exam-like practice questions

1. A corporation has the option to prepay (call) a bond with 4 years to maturity, $50M in remaining principal, a 10% yearly rate, fixed and yearly payments. It can replace this bond with a 4 year bond with the same remaining payment structure, and a new rate of 8%. Prepayment penalties are quoted as a fraction of oustanding principal. How low must the prepayment penalty be to justify calling the old bond (ignoring the option value of waiting to refi)?

2. In the previous example, what is the new payment if the prepayment penalty is financed (folded into the new bond)?

3. Company XYZ just reported the following balance sheet and income statement for the past year:

Income statement	
Sales	6M
COGS	2M
SG&A	1M
Depreciation	2M
Interest	1M
Net Income before taxes	0M
Taxes on net income	0M
Net Income	0M

Assets		Liabilities and equity	
Cash	2M	Current liabilities (oper.)	2M
Other current assets	5M	ST Debt	5M
PP&E	10M	LT Debt	10M
Intangible Assets	7M	Preferred equity	2M
		Common equity	5M

The <u>market</u> value of the company's common equity is $40M. What is the company's trailing EBITDA multiple? Treat all cash as excess cash while all other assets are operating assets. All liabilities other than common equity have a market value equal to their book value.

4. A corporation is going to generate $100,000 in FCFF over the next year ($FCFF_1 = 100,000$.) FCFF will then grow by 2% a year, for ever. The present value of the corporation's operating asset is $1M. What discount rate are investors requiring from this corporation at the FCFF level?

5. Using the same set up as in the previous question, the corporation's investment to value ($\frac{I_1}{EV_0}$) and tax to value ($\frac{T_1}{EV_0}$) ratios are 2%, permanently. What is the corporation's forward EBITDA multiple?

6. A company has a bond on its books with 100K in remaining principal to be paid back in 10 yearly payments each of 10K and a balloon payment of 20K. What is the yearly interest rate?

7. A company just issued a bond with 100K in remaining principal to be fully amortized in full in 20 yearly payments. The first 5 payments are interest only. Then payments grow by a rate of $g\%$ every year. The interest rate is 10%. What is g?

8. Consider the following probability space and random variables.

S	s_1	s_2	s_3
p	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
r_m	0.30	0.20	0.10
r_F	0.15	0.15	0.15

Here, r_m is the return on the market portfolio, r_F is the risk-free return. Assume that CAPM holds exactly. Consider an asset whose return r_1 has covariance 0.02 with r_m. What is the expected value of r_1?

9. Consider a financial economy with three assets. The (percentage terms) expected returns of assets 1, 2, and 3 are $(11, 20, 12)$, respectively. The variance-covariance matrix of these returns (also in percentage terms) is:

$$\begin{bmatrix} 300 & 150 & 0 \\ 150 & 1000 & 0 \\ 0 & 0 & 200 \end{bmatrix}.$$

Assume that the investor splits her wealth equally across the three assets. What is the expected return of this portfolio and what is the variance of this return?

10. An investor can split his wealth across 3 assets, but cannot shortsell any of those assets. The (percentage terms) expected returns of securities 1, 2, and 3 are $(10, 20, 12)$, respectively. The variance-covariance matrix of these returns is:

$$\begin{bmatrix} 400 & 100 & 400 \\ 100 & 400 & 100 \\ 400 & 100 & 400 \end{bmatrix}.$$

What is the highest expected return the investor can generate? What is the lowest variance the investor can generate?

11. Consider a project whose EBIT, each period and for ever, is either $80M or $100M with equal probability. The project is financed with an interest-only perpetuity. Debt-holders require a 8% return. Investment is $20M each period, as is depreciation. The company pays $\tau = 30\%$ in income taxes. The project has market value $1bn. $E(r^E) = 10\%$. What is the face value of the debt perpetuity?

12. An <u>untaxed</u> corporation is thinking of building a plant at a cost of $1M and operating it for 3 years. 80% of the facility is depreciable in straight line over 39 years. No other investment will be necessary. The plant produces widgets. Each year the market can absorb any quantity of widgets at a unit price of $10. The plant can produce 10,000 widgets per year. The inventory requirement is 10% of sales. Variable cost of productions are $3 per unit. There is no other cost. The plant will sell for $1M in 3 years while the inventory will sell for market value. WACC is 10%. What is the project's NPV?

13. A corporation just issued a bond with face value $100K, payments that grow each year by 10%, 7 years to maturity, and an interest rate of 8%. What is the bond's outstanding principal at the start of year 5?

14. Consider the following probability space and random variables.

S	s_1	s_2	s_3
p	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
r_m	0.30	?	0.10
r_F	0.15	0.15	0.15

Here, r_m is the return on the market portfolio, r_F is the risk-free return. Assume that CAPM holds exactly. Consider an asset whose return r_1 has covariance 0.02 with r_m. The expected value of r_1 is 0.3. What is the missing number in the table above?