

## 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 outstanding 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		Assets		Liabilities and equity	
Sales	6M	Cash	2M	Current liabilities (oper.)	2M
COGS	2M	Other current assets	5M	ST Debt	5M
SG&A	1M	PP&E	10M	LT Debt	10M
Depreciation	2M	Intangible Assets	7M	Preferred equity	2M
Interest	1M			Common equity	5M
Net Income before taxes	0M				
Taxes on net income	0M				
Net Income	0M				

The market value of the company's common equity is \$40M. What is the company's EBITDA multiple? Treat all cash as excess cash, all other current assets as operating current assets while intangibles are operating fixed assets.

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 and tax to value ratio are 2%, permanently. What is the corporation's 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 untaxed 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?