

Test F4E – October 9 2018, 8:45 – 11:45

Version I

(the formula sheet is handed out separately)

When you leave, you must also hand in the exam text, formula sheet, and all draft paper

Dictionary English - Dutch, graphical calculator allowed

Closed book, no mobile phones etc. at your desk

Please put your student card at your desk

Mention at both answer sheets that you hand in:

- your name and student number
- course-code category (TBK / BIT / PREM / other)
- version of the test as indicated at the right top

The test consists of two parts:

Part A: Finance & Accounting: multiple choice questions 1-26, and open question A

Part B: Option Pricing: multiple choice questions 27-38, and open question B

Write your answers to multiple choice questions at the computer sheet

Write your answers to open questions A and B at the UT exam paper (2+2 pages)

For grade TA on part A, the weight on the open question is 25%.

For grade TB on part B, the weight on the open question is 30%.

Part A: Finance

1. At an interest rate of 10 percent, which of the following sequences of cash flows should you prefer?

	Year 1	Year 2	Year 3
A)	500	300	100
B)	100	300	500
C)	300	300	300
D)	Any of the above as they all add up to \$900		

2. The present value of \$100,000 expected at the end of one year, at a discount rate of 25 percent per year, is

- A. \$125,000.
- B. \$75,000.
- C. \$100,000.
- D. \$80,000.

3. Which bond is more sensitive to an interest rate change of 0.75 percent?
(YTM: Yield to Maturity)

Bond A: YTM = 4.00%, maturity = 8 years, coupon = 6%, par value = \$1,000.
Bond B: YTM = 3.50%, maturity = 5 years, coupon = 7%, par value = \$1,000.

- A. Bond A
- B. Bond B
- C. Both are equally sensitive.
- D. Cannot be determined

4. An investment at 5 percent compounded continuously has an equivalent annual rate of

- A. also 5 percent.
- B. 5.13 percent.
- C. 4.88 percent.
- D. none of the options.

5. If the nominal interest rate per year is 10 percent and the inflation rate is 4 percent, what is the real rate of interest?

- A. 5.8 percent
- B. 4.1 percent
- C. 14.0 percent
- D. 10.0 percent

6. One can estimate the dividend growth rate for a stable firm as

- A. plow-back rate \times the return on equity (ROE).
- B. plow-back rate + the return on equity (ROE).
- C. plow-back rate/the return on equity (ROE).
- D. plow-back rate - the return on equity (ROE).

7. Winter Co. expects to pay a dividend of \$4.00 per share—one year from now—out of earnings of \$4.50 per share. If the required rate of return on the stock is 10 percent and its dividends are growing at a constant rate of 2 percent per year, calculate the present value of growth opportunities for the stock (PVGO).

- A. \$25
- B. \$50
- C. \$45
- D. \$5

8. The capital asset pricing model (CAPM) states which of the following?

- A. The expected rate of return on an investment is determined entirely by the risk-free rate and the market rate of return.
- B. The expected rate of return on an investment is determined entirely by the risk-free rate.
- C. The expected risk premium on an investment is proportional to its beta.
- D. The expected rate of return on an investment is proportional to its beta.

9. Investments B and C both have the same standard deviation of 20 percent and have the same correlation to the market portfolio. If the expected return on B is 15 percent and that of C is 18 percent, then the investors would

- A. prefer B to C.
- B. reject both B and C.
- C. prefer C to B.
- D. The answer cannot be determined without knowing investors' risk preferences.

10. Which of the following types of projects have the lowest unique risk?

- A. Speculative ventures
- B. Expansions of existing business
- C. New products
- D. Cost improvements

11. An example of diversifiable risk that a financial manager should ignore when analyzing a project's risk would include

- A. risks of government nonapproval of the project.
- B. overall stock price fluctuations.
- C. commodity price changes.
- D. labor costs.

12. The historical returns for the past three years for Stock B and the stock market portfolio were Stock B: 24 percent, 0 percent, 24 percent; market portfolio: 10 percent, 12 percent, 20 percent. Calculate the observed correlation of returns between Stock B and the market portfolio.

- A. 16
- B. 292
- C. 28
- D. 36

13. If capital markets are efficient, then the sale or purchase of any security at the prevailing market price is generally

- A. a zero-NPV transaction.
- B. a negative-NPV transaction.
- C. a positive-NPV transaction.
- D. No general trend exists for such transactions.

14. An efficient portfolio

- A. provides the highest expected return possible
- B. provides the highest expected return for a given level of risk
- C. has only unique risk.
- D. has the minimum risk possible.

15. The study of behavioral finance has best helped explain which of the following investor behaviors?

- A. Investors often create undiversified portfolios.
- B. Investors are often unable to short-sell unfavorable stocks.
- C. Investors are generally too slow to update their beliefs in the face of new evidence.
- D. Investors tend to sell their losing stocks and retain stocks that have capital gains.

16. Investors are particularly averse to the possibility of even a very small loss and need a high return to compensate for it. Such a concept is related to which theory?

- A. Prospect theory
- B. Random walk theory
- C. Convergence trading
- D. Market efficiency theory

17. A firm has a debt-to-equity ratio of 1. If it had no debt, its cost of equity would be 12 percent. Its cost of debt is 9 percent. What is its cost of equity if there are no taxes?

- A. 18 percent
- B. 16 percent
- C. 21 percent
- D. 15 percent

18. When comparing levered vs. unlevered capital structures, leverage works to increase EPS for high levels of operating income because interest payments on the debt

- A. stay fixed, leaving less income to be distributed over fewer shares.
- B. vary with EBIT levels.
- C. stay fixed, leaving more income to be distributed over fewer shares.
- D. stay fixed, leaving less income to be distributed over more shares.

19. If a firm permanently borrows \$50 million at an interest rate of 10 percent, what is the present value of the interest tax shield? Assume a 30 percent marginal corporate tax rate.

- A. \$1.5 million
- B. \$15 million
- C. \$50 million
- D. \$25 million

20. The pecking order theory of capital structure implies that

- A. firms maximize their tax shield.
- B. firms prefer external finance.
- C. high-risk firms will end up borrowing more.
- D. firms prefer debt to equity when external financing is required.

21. Consider the following data:

$FCF_1 = \$20$ million; $FCF_2 = \$20$ million; $FCF_3 = \$20$ million. Assume that free cash flow grows at a rate of 5 percent for year 4 and beyond. If the weighted average cost of capital is 12 percent, calculate the value of the firm.

- A. \$238.69 million
- B. \$213.53 million
- C. \$261.57 million
- D. \$300 million

22. When one uses the after-tax weighted average cost of capital (WACC) to value a levered firm, the interest tax shield is

- A. considered by deducting the interest payment from the cash flows.
- B. not accounted for by the use of the WACC.
- C. automatically considered because the after-tax cost of debt is included within the WACC formula.
- D. capitalized by the levered cost of equity.

23. Which of the following is an example of a liquidity ratio?

- A. Quick ratio
- B. Times interest earned (TIE)
- C. Return on equity
- D. P/E ratio

24. Efficiency ratios indicate

- A. whether the firm is profitable.
- B. whether the firm is using its assets productively.
- C. whether the firm is liquid.
- D. whether the firm is profitable and how highly the firm is valued by investors.

25. Assume the following data: Sales = 4,800; Cost of goods sold = 2,400; Total assets = 2,400; Inventory = 300. Calculate the inventory period.

- A. 18.3
- B. 45.6
- C. 16
- D. None of the above

26. Return on assets is useful in comparing the operating profitability of two firms in different industries, because

- A. It penalizes a high debt/equity ratio
- B. It focuses on the profit margin rather than turnover
- C. It focuses on turnover rather than the profit margin
- D. None of the above

Open question A (Give your answer at the first two pages of the UT exam paper)

Consider CAPM theory with the *S&P500* index as market portfolio (mpf). Assume that the mpf has expected (annual) return r_M is 8%, and volatility σ_M is 25%. The risk free rate is 0%.

(a) Make a sketch of (i) the Capital Market Line (CML) and (ii) the Security Market Line (SML). Clearly label your axes in both the CML and in the SML, and mark the location of the mpf in both plots.

Asset A has volatility 25%, asset B has volatility 40% ($\sigma_A = 25\%$, $\sigma_B = 40\%$). The correlation between (returns of) asset A and B is $\rho_{AB}=0.3$, between the mpf and asset A is $\rho_A=0.4$, and between the mpf and asset B is $\rho_B=0.2$.

(b) Mark in both graphs of part (a) the locations of asset A and asset B, and the mix C that consists of an equal amount invested in asset A and asset B. Sketch, without further computations required, also the locations of all other mixtures of asset A and B.

(c) Decompose the variance of asset A into systematic and unsystematic (also called unique or specific) variance.

(d) Create a portfolio in asset A and B (*short-selling* allowed) that has, according to CAPM, the same expected return as the mpf. Is this portfolio "efficient" (in the terminology of CAPM)? Explain your answer.

[end of part A]

Part B – Option Pricing

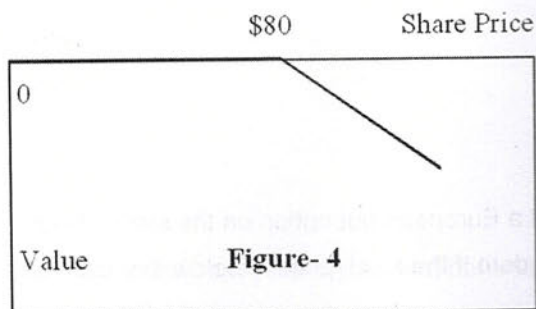
27.

The writer (seller) of a regular exchange-listed put option on a stock:

- A. has the right to buy 100 shares of the underlying stock at the exercise price.
- B. has the right to sell 100 shares of the underlying stock at the exercise price.
- C. has the obligation to buy 100 shares of the underlying stock at the exercise price.
- D. has the obligation to sell 100 shares of the underlying stock at the exercise price.

28.

Figure 4 depicts the:



- A. position diagram for the writer of a call option.
- B. profit diagram for the writer of a call option.
- C. position diagram for the writer of a put option.
- D. profit diagram for the writer of a put option.

29.

An in-the-money option will almost always generate profit.

- A. True
- B. False

30.

Consider a holder of a call and a holder of a put, both on a dividend paying stock. Which of the following statement is true?

- A. The Call-holder gets dividend but the Put-holder not
- B. The Put-holder gets dividend but the Call-holder not
- C. Both gets dividend
- D. None gets dividend

31.

Suppose Ralph's stock price is currently \$60. In the next six months, it will either fall to \$45 or rise to \$70. What is the delta of a put option with an exercise price of \$50?

- A. +0.2
- B. -0.2
- C. -1.33
- D. None of the above

32.

Suppose an investor buys one share of stock and a European put option on the stock. What will be the value of her investment at the maturity date if the stock price is below the exercise price? (Ignore transaction costs.)

- A. The value of two shares of stock.
- B. The value of one share of stock plus the exercise price.
- C. The value of one share of stock minus the exercise price.
- D. The exercise price.

33.

All else equal, as the time to maturity decreases, the:

- A. value of a put option increases and that of a call option decrease.
- B. value of a put option decreases and that of a call option increase.
- C. value of both a put option and a call option increase.
- D. value of both a put option and a call option decrease.

34.

All else equal, if the current price of the stock increases, then the:

- A. value of a put option increases and that of a call option decrease.
- B. value of a put option decreases and that of a call option increase.
- C. value of both a put option and a call option increase.
- D. value of both a put option and a call option decrease.

35.

Suppose an investor wishes to "cash-in" an in-the-money American call option that has lots of time till expiration and the underlying does not pay dividend. The risk-free rate is positive. The investor will be better off trading the option to another investor rather than exercising the option early.

- A. True
- B. False

36.

If the stock makes a dividend payment before the expiration date, then the put-call parity relation is: [PV = present value]

- A. Value of call = value of put + share price + PV of dividend + PV of exercise price.
- B. Value of call = value of put - share price - PV of dividend + PV of exercise price.
- C. Value of call = value of put + share price - PV of dividend - PV of exercise price.
- D. Value of call = value of put + share price + PV of dividend - PV of exercise price.

37.

A call option has an exercise price of \$80. At the exercise date, the stock price could be either \$40 or \$120. Which of the following investment strategies (disregarding the cost of building such a portfolio) provides the same payoff as the stock, at maturity?

- A. Borrow \$40 and sell two calls.
- B. Borrow \$40 and buy two calls.
- C. Lend (put in bank) PV of \$40 and sell two calls.
- D. Lend (put in bank) PV of \$40 and buy two calls.

38.

You own one stock, but want to have downside protection when the stock goes down by more than 20%. You accept a limitation of upside potential when the stock goes up by more than 20%. You can obtain this by

- A. Buying a Put, shorting a Call, both out-of-the-money.
- B. Buying a Put, shorting a Call, both in-the-money.
- C. Buying an out-of-the-money Put and shorting an in-the-money Call.
- D. Buying a Call, shorting a Put, both out-of-the-money.

Open question B

A stock is currently selling for \$100. The stock price could go up by 4.2% or fall by 4% each month. The monthly risk-free interest rate is 0.3%. We want to calculate the price of a put option on the stock with an exercise price of \$100 and a maturity of two months by using the two-stage binomial method. To that end

- (a.) Calculate the risk neutral probability that the stock will go up.

[if, *and only if*, you cannot find the probability in (a.), use 0.45 for the next two parts]

- (b.) Find the price of the option mentioned above if it is European.
- (c.) Find the price if it is an American option.

[end of part B]