Exam May 2023

1. Which one of the following statements is **not** correct?
    a. Concave utility functions imply that each additional unit of a good gives less utility than its predecessor
    b. The more concave an individual's utility function is, the more risk averse is the individual
    c. The certainty equivalent is the risk premium that persons require to accept the risk of an uncertain outcome instead of a certain one.
    d. The introduction of a financial market that gives the opportunity to move consumption back and forth in time, and where deals are done free of charge, has the consequence that most individuals are better off and nobody worse.
    e. Fisher separation implies that investment and consumption decisions can be separated

2. You believe that a company will be worth 100 Euros per share one year from now. How much should you be willing to pay for one share today if the risk-free rate is 3 %, the expected return on the market is 8 % and the company's Beta is 2.0?
    a. 88.5 Euro
    b. 94.3 Euro
    c. 86.2 Euro
    d. 90.1 Euro
    e. 82.0 Euro

3. Select the option which is TRUE. Regarding models of market efficiency:
    a. In a fair game, the result never deviates from the expected value.
    b. In a Martingale the properly discounted future values are equal to the present value.
    c. Random walk processes have the property of memory preservation.
    d. Random walk, Martingale and fair game, all consider only the expected result.
    e. None of the above.

4. Select the option which is TRUE.
    a. The efficient market hypothesis states that the market price is always right.
    b. Large fluctuation in stock prices means that the market is inefficient.
    c. If the markets are efficient, then all stocks are similar in regard to profit opportunities.
    d. People that make money trading stock prove that the market is inefficient.
    e. None of the above.

5. Those are characteristics of common bonds, except:
    a. Bonds offer no property rights.
    b. Bonds are permanent investments.
    c. Bonds can be market traded.
    d. Bonds can be underlying for derivatives.
    e. Bonds have fixed maximum return.

6. Those are characteristics of common stocks, except:
    a. Stocks may offer property rights.
    b. Stocks are permanent investments.
    c. Stocks can be market traded.
    d. Stocks can be underlying for derivatives.
    e. Stocks have fixed maximum return.

7. Which of the following is NOT a real option?
    a. A stock option
    b. An abandonment option
    c. An investment timing option
    d. An expansion option
    e. A follow-up investment option

8. Which of the following will decrease the value of a call option?
    a. An increase in the time to maturity
    b. An increase in the stock price
    c. An increase in the stock's volatility
    d. An increase in the exercise price
    e. An increase of the interest rate

1. Consider two alternatives, A and B, with the following expected returns and corresponding probability distributions

$$A = \begin{cases} 1 \; with \; prob. = \; 0.5 \\ 9 \; with \; prob. = 0.5 \end{cases} \quad B = \begin{cases} 4 \; with \; prob. = \; 0.99 \\ 9 \; with \; prob. = 0.01 \end{cases}$$

You want to choose between the two alternatives. Determine your choice using:
   i. Mean-Variance efficiency
   ii. Maximizing expected utility, using the utility function $u(x) = \sqrt{x}$

2. Consider a publicly traded company and a market index that have performed as follows over the past four years:

Year	Price (beginning - end of year)	Dividend	Market index (beginning – end of year	Market dividend
2019	25 – 27	1.00	100 – 105	3.05 %
2020	27 – 29	1.00	105 – 110	3.00 %
2021	29 – 32	1.50	110 – 120	2.95 %
2022	32 – 33	1.50	120 – 125	2.80 %

The relevant risk-free rate over the period is 3 % per year.

   (a) From the information given above - calculate the company's Beta and interpret the result.
   (b) Shares are considered permanent investments and their valuation is commonly based on an infinite stream of dividend payments that are assumed to grow over time. The company expects at end of 2022 to pay a dividend of 2.00 after one year and further expects its dividend growth rate to be 5 % in the future. What should be a fair price of the traded company's share at Dec 31, 2022?

3. The Corporation ABC has a current stock price of 15 per share. The volatility of the returns is 30% and the risk-free interest rate is 4%. Consider an European call option on the stock with a strike price equal to 15 and with maturity of one year.
   (a) Assume that the stock pays no dividends. Calculate the option price and the option delta. Explain the meaning of the option delta.
   (b) Assume now that the stock pays dividends of 2 after 6 months. Calculate know the new option delta.

4. A given stock can go up by 15% or down by 10% every year. Both outcomes are equally likely. There are no payment of dividends. The yearly risk-free rate is 5% and the current stock price is 100.
   (a) Present the stock price movement in a two-period binomial tree assuming that each period corresponds to one year.
   (b) Consider a European put option on the stock. Calculate the risk neutral probabilities and the payoffs for the last period, assuming that the strike price is 100.
   (c) Calculate the price of a European put option with a strike price of 100 using the binomial valuation model.