



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF ECONOMICS AND FINANCE

EAE 414: THEORY OF FINANCE

DATE: 11/8/2021

TIME: 2:00 – 4:00 PM

INSTRUCTIONS:

- (i) Answer question one (COMPULSORY) and any other two questions
- (ii) Do not write on the question paper
- (iii) Show your workings clearly

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Explain the difference between the following terms as used in theory of finance: (10 marks)
 - i. Arbitrage and Strong Arbitrage
 - ii. First Order stochastic dominance and Second Order stochastic dominance
 - iii. Payoff matrix and asset span
 - iv. Variance and Covariance
 - v. Asset redundancy and the law of one price
- b) A security market has three securities. Security one has a payoff of 10 in state one, -5 in state two and a payoff of 3 in state 3. Security two has a payoff of -7 in state one, 14 in state two and a payoff of -5 in state 3. Security three has payoff of -1 in state one, -5 in state two and a payoff of 7 in state 3. If the security prices are 55, 27 and 18 for security one, two and three respectively;
 - i. If these securities comprise a securities market, is the market complete? (6 marks)
 - ii. Find and interpret the risk-free rate in this market (1 mark)

- c) Consider the following three securities which give the stated payoffs at the stated probabilities

Security 1		security 2		Security 3	
Payoff	Prob.	Payoff	Prob.	Pay off	Prob.
8	0.25	2	0.33	12	0.20
10	0.50	12	0.33	20	0.70
24	0.25	16	0.33	26	0.10

- i. Draw the pairwise cumulative distribution curves for the payoffs in separate panels (9 marks)
- ii. Using valid reasons and proof, show which pairs of these securities exhibit first order stochastic dominance and second order stochastic dominance (4 marks)

QUESTION TWO (20 MARKS)

- a) Market completeness is an important concept in securities markets, using relevant examples, explain three implications market completeness (6 marks)
- b) Suppose that there are two states and two securities with payoffs $x_1(1,1)$ and $x_2(2,0)$. The representative agent's utility function is given by:

$$u(c_0, c_1, c_2) = \ln(c_0) + \frac{1}{2}\ln(c_1) + \frac{1}{2}\ln(c_2) \quad \text{where, } c_0, c_1, c_2 > 0$$

If endowment at date 0 and 1 is 1 and (1, 2) respectively and given that the law of one price is satisfied in this security economy find:

- i. The price of portfolio $h = [h_1, h_2]$ assuming that the price of h_1 and h_2 is p_1 and p_2 , respectively. (2 marks)
- ii. The asset span M (3 marks)
- iii. Formulate and solve the consumption portfolio choice problem for this agent (9 marks)

QUESTION THREE (20 MARKS)

- a) Using a relevant illustration, derive the no arbitrage condition (8 marks)
- b) The following data has been developed for Company A, the manufacturer of gas cylinders:

State of nature	Probability	Market return R_m	Return for the firm R_j
1	0.1	-0.25	-0.20
2	0.3	0.10	0.10
3	0.4	0.15	0.20
4	0.2	0.20	0.40

Given that the risk-free rate is 8%.

Required:

- i. The expected market return (2 marks)
- ii. The variance of the market return (2 marks)
- iii. The expected return for Company A (2 marks)
- iv. The covariance $Cov(R_j, R_m)$ (3 marks)
- v. State the CAPM (3 marks)

QUESTION FOUR (20 MARKS)

- a) Using relevant examples, explain four elements of asset pricing. (8 marks)
- b) State and solve the consumption portfolio choice problem under short sale restrictions. (8 marks)
- c) Suppose there are two securities and two states of the economy. Security 1 pays off 2 in state 1 and 1 in state 2 while security 2 pays off 1 in state 1 and 2 in state 2. For simplicity, suppose that the prices are unity for securities 1 and 2, that is $p_i = 1$ for $i = 1, 2$.

Compute:

The state prices and the risk free interest rate. (4 marks)

QUESTION FIVE (20 MARKS)

- a) State and solve the consumption portfolio choice problem when the law of one price is satisfied. (8 marks)
- b) In a one-period two-state economy the risk-free interest rate over the period is 25%. An asset that pays out 200 in state 1 and 400 in state 2 trades at a price of 220. Compute the no-arbitrage price of a second risky asset that pays out 400 in state 1 and 200 in state 2. (6 marks)
- c) Suppose that risk is defined in terms of variance. Given the following probability distributions for the returns of risky assets X and Y: (6 marks)

Probability x_i	x_i	Probability y_i	y_i
0.1	-10	0.2	2
0.4	5	0.5	3
0.3	10	0.2	4
0.2	12	0.1	30

Find which asset would be preferred on the basis of mean and variance if the only available choice is to invest 100% of the wealth in X or 100% in Y.