



MACHAKOS UNIVERSITY

UNIVERSITY EXAMINATIONS 2019/2020

SUPPLEMENTARY EXAMINATION

EAE 414: THEORY OF FINANCE

DATE:

TIME:

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

(30 MARKS)

- a) Define the following as used in finance
 - i) Law of one price **(2 marks)**
 - ii) Bid-Ask spread **(2 marks)**
 - iii) Arbitrage and strong arbitrage **(2 marks)**
 - iv) Risk free asset **(2 marks)**
 - v) Redundant Security **(2 marks)**
- 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) Form the payoff matrix for this market **(3 marks)**
 - ii) Is the securities market complete? **(7 Marks)**

- c) Differentiate between first order and second order stochastic dominance. Clearly explain how to test for the two. **(5 Marks)**
- d) Explain the elements of asset pricing **(5 Marks)**

QUESTION TWO

(20 Marks)

- a) Security X and Y have the following characteristics under different states of the economy

State of economy	Probability	Returns for X (%)	Returns for Y (%)
A	0.05	30	-20
B	0.25	20	10
C	0.30	10	20
D	0.30	5	30
E	0.10	-10	40

Required:

- i) Compute the expected returns, variance and standard deviation for each of the individual securities **(8 marks)**
- ii) If the investment have equal weights , calculate the expected return for the portfolio **(3 marks)**
- iii) If the covariance for Security X and Y is given as = - 123.5
Calculate the variance and standard deviation of the portfolio **(4 marks)**
- iv) Compare and contrast the standard deviation of the individual securities and the portfolio **(5 marks)**

QUESTION THREE

(20 MARKS)

- a) Given that $y = mx + c$ where m and c are constants, use the properties of mean and variance to prove that;
- i) $E(y) = c + mE(x)$ Where E is the expectations operator **(3 marks)**
- ii) $Var(y) = m^2Var(x)$ **(3 marks)**
- b) Given that securities X and Y are perfectly correlated such that

$Y = 11.15789 - 0.315789X$ and the probability distribution of X is;

probability	x_i %
0.2	11
0.2	9
0.2	25
0.2	7
0.2	-2

Find; $E(X)$ and $Var(X)$ (3 marks)

$E(Y)$ and $Var(Y)$ (3 marks)

- c) Write down the equations for expected portfolio return and variance for a portfolio consisting of security X and Y if a % is invested in security X and b % is invested in Y (2 marks)
- d) Use the equations in (c) above to complete the following table given that $cov(x, y) = -0.0024$. $E(R_p)$ and $\sigma(R)$ are expected portfolio returns and standard deviation of portfolio returns respectively. (6 marks)

Percentage in X	percentage in Y	$E(R_p)\%$	$\sigma(R) = \sqrt{\text{var}(R_p)}$	$\sigma\%$
100	0			
75	25			
50	50			
25	75			
0	100			

Use the table in (d) above to demonstrate the significance of portfolio diversification (6 marks)

QUESTION FOUR (20 MARKS)

- a) Explain the importance of financial markets in the economy (10 marks)
- b) State the agents consumption portfolio choice problem under short sale restrictions (1 mark)

c) Let there be two securities: a risky security with return denoted by r and a risk free security with return r^* . For a portfolio (h_1, h_2) such that $p_1 h_1 + p_2 h_2 = w$, let $a = p_2 h_2$ denote the amount invested in the risky security. Required;

i) Represent portfolio (h_1, h_2) in terms of wealth **(3 marks)**

ii) What significance does the reformulation in (i) above have? **(2 marks)**

iii) State the payoff of the portfolio in (i) above in terms of w , a , r , and r^* **(2 marks)**

iv) State the agents portfolio choice problem given that the representative agents utility function is $u = V(z)$, where z is a portfolio payoff. **(2 marks)**

QUESTION FIVE

(20 MARKS)

a) Define incomplete markets and explain the implications of market completeness.

(8 Marks)

b) Distinguish between unlimited arbitrage and unlimited strong arbitrage **(4 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

X	Probability of X	Y	Probability of Y
-10	0.1	2	0.2
5	0.4	3	0.5
10	0.3	4	0.2
12	0.2	30	0.1

Find which asset would be preferred on the basis of mean and variance if the only available choice is 100% of the wealth in X or 100% in Y. **(8 Marks)**