School of Mathematics, Computer Science and Engineering

Managing Risk and Uncertainty: Multiple Choice Test

Answer **ALL** questions
Questions carry equal marks. There is no negative marking for incorrect answers
Pass mark: 50 %
start: ????, end: ?????

General Instructions:

- Send your answers via a one-line email to g.halikias@city.ac.uk in the following format: Q1:X, Q2:X,..., Q15:X (where X=A,B,C or D)
- Subject of email should read: EPM944 test, Your Name, Your ID
- Emails will not be accepted if sent later than 10 minutes after the end of the test.

Internal Examiner: Prof. G. Halikias

[Refers to Questions Q1-Q3 below] Consider the loss function X with the following probability distribution:

$$P[X = -1] = 0.5,\ P[X = 0] = 0.2,\ P[X = 2] = 0.3$$

Question 1: The expected value and variance of X, respectively are:

(A) 0.2 and 2.25, **(B)** 0.1 and 1.69, (C) 0.1 and 2.25, (D) other.

Question 2: $\text{VaR}_{0.8}(X)$ is equal to:

(A) 0, (B) 1, **(C)** 2, (D) other.

Question 3: $\text{CVaR}_{0.6}(X)$ is equal to:

(A) -1, (B) 0, **(C)** 1.2, (D) other.

Question 4: An airline knows that 5 percent of the people making reservations on a certain ight will not show up. Consequently, their policy is to sell 52 tickets for a flight that can hold only 50 passengers. Let p be the probability that there will be a seat available for every passenger that shows up. p is:

(A) 0.6525, (B) 0.7015, **(C)** 0.7405, (D) other.

Question 5: If X is a loss function and $0 < \beta < 1$ then:

(A) $\text{VaR}_\beta(X) = \text{CVaR}_\beta(X)$, **(B)** $\text{VaR}_\beta(X) \leq \text{CVaR}_\beta(X)$, (C) $\text{VaR}_\beta(X) \geq \text{CVaR}_\beta(X)$, (D) $\text{VaR}_\beta(X) \leq \text{CVaR}_{2\beta}(X)$

Question 6: An investor has utility function $U(x) = 1 - e^{-2x}$. The investor is:

(A) risk-averse, (B) risk-neutral, (C) Risk-seeker, (D) unknown - it cannot be determined.

[Refers tp Q7 and Q8] An initial payment of £10 yields returns of £4 and £8 at the end of the first and second period (respectively). The two periods have equal length.

Question 7: If the discounting factor is 10% the NPV of the cash stream is (to an accuracy of two significant figures):

(A) 0.1, **(B)** 0.25, (C) 0.5, (D) other.

Question 8: The rate of return of the cash stream is equal to:

(A) 6.05%, **(B)** 11.65%, (C) 18.10%, (D) other.

[Refers to Q9 and Q10] The mean and covariance matrix of a vector of returns of two assets is

$$\mu = \begin{pmatrix} 1 \\ 2 \end{pmatrix} \text{ and } \Sigma = \begin{pmatrix} 1 & 0.5 \\ 0.5 & 2 \end{pmatrix}$$

respectively.

Question 9: Consider a portfolio of the two assets with weights $w_1 = w_2 = 0.5$. The expected return and variance of the portfolio are, respectively:

(A) 1 and 1.5 **(B)** 1.5 and 1, (C) 1.5 and 2, (D) other.

Question 10: Assume that the portfolio weights satisfy $w_1 + w_2 = 1$, $w_1 \geq 0$ and $w_2 \geq 0$ (no short selling). The minimum portfolio variance achievable is:

(A)0, (B) $\frac{3}{8}$, **(C)** $\frac{7}{8}$, (D) other.

[Refers to Q11-Q14] You want to decide between investment A and investment B. Investment A costs £100K upfront and B costs £150K upfront. If the economy performs well A brings in £750K but if it performs poorly it makes a loss of £250K. The corresponding figures for investment B are a gain of £850K and a loss of £300K, respectively. There is 60% chance that the economy performs well and 40% chance that it performs poorly. Assume that the company is risk-neutral.

Question 11: Which is the optimal choice of investment?

(A) Investment A, (B) investment B, (C) A and B have the same value, (D) Cannot tell

Question 12: The expected return of A is:

(A) £750K, (B) -£250K, **(C)** £250K, (D) other.

Question 13: If the expected return of investment B increases to £260K the optimal choice is:

(A) Investment A, **(B)** investment B, (C) A and B have the same value, (D) Cannot tell

Question 14: If the chances of the economy performing well/poorly are $50:50$ which is the new best option?

(A) Investment A, (B) investment B, (C) A and B have the same value, (D) Cannot tell.

Question 15: X is uniformly distributed between 0 and 1. If $0 \leq a \leq 1$ the expected value of the random variable is:

(A) a^2, (B) $2a^2$, **(C)** $\frac{a(2-a)}{2}$, (D) other.