Solution of Assignment 5

Q1. The standard parameters of a normal distribution are
(a) **μ and σ^2**
(b) μ^2 and σ
(c) μ^2 and σ^2
(d) Any of the above

Q2. Which type of distribution model is viewed as sum of several exponentially distributed processes?
(a) Binomial
(b) Negative binomial
(c) **Erlang**
(d) Lognormal

Q3. The covariance between the joint random variables X and Y, denoted by Cov (X, Y) is defined by
(a) **E(XY) – E(X)E(Y)**
(b) E(X)E(Y) – E(XY)
(c) E(X) + E(Y) – E(XY)
(d) E(XY) + E(X)E(Y)

Q4. Cov (X, Y) > 0 means X and Y are
(a) **Positively correlated**
(b) Negatively correlated
(c) Uncorrelated
(d) None of these

Q5. Which of the following statement is correct for Empirical model?
(a) All outcomes are equally likely
(b) A process when only the minimum, most likely and maximum values of the distribution are known
(c) **Often used when no theoretical distribution seems appropriate**
(d) None of these

Q6. Which of the following statement is correct for Triangular model?
(a) All outcomes are equally likely
(b) **A process when only the minimum, most likely and maximum values of the distribution are known**
(c) Resamples from the actual data collected; often used when no theoretical distribution seems appropriate
(d) None of these

Q7. The correlation between the random variables X and Y, denoted by Cor (X, Y), is defined by
(a) **Cor (X, Y) = Cov (X, Y) / (Var (X) Var (Y))$^{1/2}$**
(b) Cor (X, Y) = Cov (X, Y) (Var (X) Var (Y))$^{1/2}$
(c) Cor (X, Y) = (Var (X) Var (Y))$^{1/2}$
(d) Cor (X, Y) = Cov (X, Y) + (Var (X) Var (Y))$^{1/2}$

Q8. Var (X) is defined as
(a) $[E(X)]^2 – E(X^2)$
(b) **$E(X^2) - [E(X)]^2$**
(c) $E(X^2) + [E(X)]^2$
(d) $[E(X)]^2 + E(X^2)$

Q9. Independent random variables are always
(a) Positively correlated
(b) Negatively correlated

(c) **Uncorrelated**
(d) None of these

Q10. A quantile-quantile plot is useful tool for evaluating
(a) **Distribution fit**
(b) Uniformity
(c) Dependence
(d) Both uniformity and dependence

Q11. Suppose that X and Y are jointly discrete random variables with

$$p(x,y) = \begin{cases} \dfrac{x+y}{30} & for\ x = 0,1,2\ and \\ & y = 0,1,2,3 \\ 0 & otherwise \end{cases}$$

Expression for $P_x(x)$ will be

(a) **(2x+3)/15**
(b) (2x+7)/15
(c) (3x+7)/15
(d) (3x+11)/15

Solution: $P_x(x) = \sum_{y=0}^{3}(x+y)/30$ = (2x +3) /15

Q12. Suppose that X and Y are jointly discrete random variables with

$$p(x,y) = \begin{cases} \dfrac{x+y}{30} & for\ x = 0,1,2\ and \\ & y = 0,1,2,3 \\ 0 & otherwise \end{cases}$$

Then, E (X, Y) will be equal to

(a) 14/5
(b) **12/5**
(c) 16/5
(d) 13/12

Solution: E (X, Y) = $\sum_{x=0}^{2} \sum_{y=0}^{3} xy\ p(x,y)$ = (1/30) $\sum_{x=0}^{2} \sum_{y=0}^{3} (x^2 y + x y^2)$ = 12/5

Q13. Suppose that X and Y are jointly discrete random variables with

$$p(x,y) = \begin{cases} \dfrac{x+y}{30} & for\ x = 0,1,2\ and \\ & y = 0,1,2,3 \\ 0 & otherwise \end{cases}$$

Then, E (X) will be equal to

(a) 16/15
(b) 17/15
(c) **19/15**
(d) 23/15

Solution: E (X) = $\sum_{x=0}^{2} x\ p_x(x)$ = 0(3/15) + 1(5/15) + 2 (7/15) = 19/15

Q14. The important step in developing model from input data are

(i) Collect data from the real system of interest.

(ii) Identify probability distribution to represent process

(iii) Choose parameters that define a distribution family

(iv) Evaluate for goodness of fit

Chi square and K-S test are used for

(a) Only iv
(b) Only ii and iv
(c) Only iii and iv
(d) Only ii

Q15. Match the following type of distribution with their property given in the table below.

Distribution	Property
(A) Poisson	(i) All outcomes are equally likely
(B) Exponential	(ii) Models time between independent events, has a memoryless property
(C) Uniform	(iii) Models the number of independent events that occur in a fixed amount of time or space

(a) A-iii, B-i, C-ii
(b) A-ii, B-i, C-iii
(c) A-ii, B-iii, C-i
(d) **A-iii, B-ii, C-i**