Benha University

Faculty of Engineering (Shoubra)

Mathematical Engineering and Physics Department

Final Examination for Qualification Year students

Statistics and Probability

Date: 13-6-2015

Time: 2 hours

Answer the following questions:

Question no (1):- [50 points]

(a)

A fair die is tossed twice. Find the probability of getting a 4, 5 or 6 on the first toss and a 1, 2, 3 or 4 on the second toss.

(b)

A card is drawn at random from an ordinary deck of 52 playing cards. Find the probability that it is (a) an ace, (b) a jack of hearts, (c) a three of clubs or a six of diamonds, (d) a heart, (e) any suit except hearts, (f) a ten or a spade, (g) neither a four nor a club.

Question no (2):- [50 points]

(a)

A random variable X has the density function $f(x) = c/(x^2 + 1)$, where $-\infty < x < \infty$. (a) Find the value of the constant c. (b) Find the probability that X^2 lies between 1/3 and 1.

(b)

The joint probability function of two discrete random variables X and Y is given by $f(x, y) = c(2x + y)$, where x and y can assume all integers such that $0 \leqq x \leqq 2$, $0 \leqq y \leqq 3$, and $f(x, y) = 0$ otherwise.

(a) Find the value of the constant c. (c) Find $P(X \geqq 1, Y \leqq 2)$.

(b) Find $P(X = 2, Y = 1)$.

Question no (3):- [50 points]

(a)

If $X^* = (X - \mu)/\sigma$ is a standardized random variable, prove that (a) $E(X^*) = 0$, (b) $\text{Var}(X^*) = 1$.

The joint probability function of two discrete random variables X and Y is given by $f(x, y) = c(2x + y)$, where x and y can assume all integers such that $0 \le x \le 2$, $0 \le y \le 3$, and $f(x, y) = 0$ otherwise.

(b)

Find the value of the constant c.

Find   (a) $E(X)$, (b) $E(Y)$, (c) $E(XY)$, (d) $E(X^2)$, (e) $E(Y^2)$, (f) $\text{Var}(X)$, (g) $\text{Var}(Y)$,

Question no (4):-   [50 points]
(a)

The mean weight of 500 male students at a certain college is 151 lb and the standard deviation is 15 lb. Assuming that the weights are normally distributed, find how many students weigh (a) between 120 and 155 lb, (b) more than 185 lb.

(b)

Find the probability of getting between 3 and 6 heads inclusive in 10 tosses of a fair coin by using (a) the binomial distribution, (b) the normal approximation to the binomial distribution.