

DIGITAL ASSIGNMENT 1

STATISTICS FOR ENGINEERS – MAT2001

Module 1 & 2

Submission Date: ~~XXXXXXXXXX~~

1. Calculate the mean, median and mode from the following data.

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of Students	4	12	40	41	27	13	9	4

2. Find the missing frequency from the following frequency distribution if Mean is 38.

Marks	10	20	30	40	50	60	70
No. of Students	8	11	20	25	?	10	3

3. Calculate G.M and H.M for the following data

Marks	0-10	10-20	20-30	30-40	40-50
No. of Students	8	12	18	8	6

4. An analysis of monthly wages of workers of two factories A and B yielded the following results:

	Factories	
	A	B
No. of workers	50	60
Average monthly wages	Rs.60	Rs.48

Obtain the average monthly wages of all workers taken together.

5. Following data represent life of two models of refrigerators A and B.

Life (in months)	Refrigerator	
	Model A	Model B
500-700	5	4
700-900	11	30
900-1100	26	12
1100-1300	10	8
1300-1500	8	6

Find the average life of each model. Which model has greater uniformity?

6. For the data given here, give the quartile deviation:

X	351-500	501-650	651-800	801-950	951-1100
F	48	189	88	47	28

7. Calculate A.M., S.D., γ_1 and γ_2 and comment upon the nature of skewness and kurtosis

X	5	6	7	8	9
F	5	10	24	15	6

8. A random variable X has the following probability distribution:

$X = x$	-2	-1	0	1	2	3
$P(x)$	0.1	k	0.2	$2k$	0.3	$3k$

(a) Find the value of k , (b) evaluate $P(X < 2)$ and $P(-2 < X < 2)$

(b) Find the c.d.f. of X , (d) evaluate the mean of X .

9. A discrete R.V X has the probability function as given below:

$X = x_i$	0	1	2	3	4	5	6	7
p_i	0	a	$2a$	$2a$	$3a$	a^2	$2a^2$	$7a^2+a$

(i) Find the value of 'a'. Write its distribution function and c.d.f.

(ii) If $P(X \leq k) > \frac{1}{2}$, find the least value of k .

10. The probability that a person will die in the time interval (t_1, t_2) is given by

$P(t_1 \leq t \leq t_2) = \int_{t_1}^{t_2} a(t)dt$. The function $a(t)$ is determined from long records and can be assumed to be $a(t) = \begin{cases} 3 \times 10^{-9} t^2 (100 - t)^2, & 0 \leq t \leq 100 \\ 0, & \text{otherwise} \end{cases}$

Determine (i) The probability that person will die between the ages 60 and 70 &

(ii) The probability that he will die between those ages, assuming that he lived up to 60.

11. If the density function of a continuous R.V. X is given by

$$f(x) = \begin{cases} ax, & \text{in } 0 \leq x \leq 1 \\ a, & \text{in } 1 \leq x \leq 2 \\ 3a - ax, & \text{in } 2 \leq x \leq 3 \\ 0, & \text{elsewhere} \end{cases}$$

(i) Find the value of a , (ii) find the c.d.f. of X .

12. The joint p.d.f of the R.V (X, Y) is given by $kxye^{-(x^2+y^2)}$; $x > 0, y > 0$. Find the value of k and prove also that X and Y are independent.

13. A gun is aimed at a certain point, say, the origin of the co-ordinate system. Due to the random factors, the actual hit point can be any point (X, Y) in a circle of radius a with center at the origin. If the joint density function of (X, Y) can be assumed as

$$f(x, y) = k, \text{ for } x^2 + y^2 \leq a^2 \text{ and } = 0, \text{ otherwise,}$$

(i) Find the value of k and (ii) The marginal density function of X .

14. If the joint p.d.f. of a two dimensional continuous R.V. (X, Y) is given by $f(x, y) = 3(x + y)$, in $x > 0, y > 0$ and $x + y \leq 1$ and $= 0$, elsewhere, find $Var(X), Var(Y)$ and $Cov(X, Y)$.

15. Find the characteristic function of the distribution of a discrete $R.V.$ X , whose probability mass function is given by $P(X = r) = q^r p$; $r = 0, 1, 2, \dots, \infty$, where $p + q = 1$. Hence find the mean and variance of the distribution.

16. If the p.d.f of a continuous $R.V.$ X is given by $f(x) = k(1 + x)e^{-2x}$, in $-1 \leq x < \infty$, find the value of k , mean and variance of X , by finding the M.G.F. of X .