1. Two balls are selected at random from a box containing 3 red 2 green and 4 white balls. If X and Y are the number of red and green balls respectively included among the two balls drawn from the box find
2. Joint probability of X and Y
3. Marginal probabilities of X and Y
4. Conditional distribution of X for given Y = 1.

**Normal Distribution:**

1. Find the area ***A*** under the normal curve:
   1. to the left of *z* = -1.78
   2. to the left of *z* = 0.56
   3. to the right of *z* = -1.45
   4. corresponding to *z*  2.16
   5. corresponding to  0.80  *z* 1.53
   6. to the left of *z* = -2.52 and to the right of *z* = 1.83
2. If *z* is normally distributed with mean 0 and variance 1, find

a. *P**z*  1.64

b. *P*1.96  *z*  1.96

1. *P**z*  1
2. *P**z*  1
3. Determine the value of *z* such that,
   1. area to the right of *z* is 0.2266
   2. area to the left of *z* is 0.0314
4. Find the (a) mean and (b) standard deviation of an examination in which grades 70 and 88 correspond to standard scores of -0.6 and 1.4 respectively.
5. Determine the minimum mark a student must get in order to receive an A grade if the top 10% of the students are awarded A grades in an examination where the mean mark is 72 and standard deviation is 9.
6. Find the mean and standard deviation of a normal distribution in which 7% of the items are under 35 and 89% are under 63.
7. Assume that the ‘reduction’ of a person’s oxygen consumption during a period of Transcendenta Meditation (T.M.) is a continuous random variable X normally distributed with mean 37.6 cc/mt and s.d. 4.6 cc/mt. Determine the probability that during a period of T.M. a person’s oxygen consumption will be reduced by
8. at least 44.5 cc/mt, (b) at most 35.0 cc/mt, (c) anywhere from 30.0 to 40.0 cc/mt.
9. The marks X obtained in mathematics by 1000 students is normally distributed with Mean 78% and S.D. 11%. Determine (a) How many students got marks above 90% ?
10. What was the highest mark obtained by the lowest 10% of students?
11. Find the probability that a random variable having the standard normal distribution will take on a value between (a) 0.87 and 1.28, (b) -0.34 and 0.62.
12. If X is normal variate with mean 10 and s.d. 4, find i)

*P*5  *X*  18, ii)

*P**X*  12,

iii) *P**X* 14  1

1. The marks obtained by students in a college are normally distributed with mean 65 and variance 25. If 3 students are selected at random from this college, what is the probability that at least one of them would have scored more than 75 marks?
2. A manufacturer knows from his experience that the resistance of resistor he produces

is normal with **  100 ohms and s.d.**  2 ohms. What percentage of resistor will

have resistance between 98 ohms and 102 ohms?

1. For a normal variate X with mean 25 and s.d.10, find the area between i) X = 25, X = 35, ii) X = 15, X = 35 and iii) X  15, iv) X  35.
2. If ‘*z’* is a standard normal variate, find ‘*c’* such that

i) *P* *c*  *z*  *c* 0.95, ii) *P**z*  *c* 0.01

1. If ‘X’ is a normal variate with mean 120 and s.d.10, find ‘*c’* such that

i) *P**X*  *c* 0.02 , ii) *P**X*  *c* 0.05 .

1. Monthly salary X in a big organization is normally distributed with mean Rs.3000 and s.d. of Rs.250. What should be the minimum salary of a worker in this organization, so that the probability that he belong to top 5% workers?
2. The diameters of can tops produced by a machine are normally distributed with

s.d. of 0.01 cms. At what, mean diameter, the machine be set so that not more than 5% of the can tops produced by the machine have diameters exceeding 3 cms.?

1. If X is a normal variate with mean 25 and s.d. 5, find the value
2. of X =
3. of X =
4. of X =

*x*1 , such that *x*2 , such that *x*3 , such that

*P**X*  *x*1  0.32 *P**X*  *x*2  0.73 *P**X*  *x*3   0.24

1. If X is a normal variate with mean 30 and s.d. 5, find the probabilities that

(i) 26  *X*  40, (ii)

*X*  45, (iii)

*X*  30  5.

1. If *X*1 & *X* 2 are two independent random variables with means 30 & 25 and variance

16 & 12 respectively, if *Y*  3*X*1  2*X* 2 , find

*P*60  *Y*  80.

1. If

*X*1 & *X* 2 are two independent random variates with N (3, 4) and N (8, 5)

respectively , find the probability that a point ( *X*1 , *X* 2 ) will lie between the lines

5*X*1  3*X* 2  8 & 5*X*1  3*X* 2  15.

1. The marks obtained by students in a certain examination follow a normal distribution with mean 45 and s.d. 10. If 1000 students appeared at an examination, calculate the number of students scoring (i) less than 40 marks, (ii) more than 60 marks.
2. The incomes of a group of 10,000 persons were found to be normally distributed with mean Rs.520 and s.d. Rs.60. Find (i) the number of persons having incomes between Rs.400 and 550, (ii) the lowest income of the richest 500.
3. If the actual amount of coffee which a filling machine puts into 6 ounce jars is a random variable having normal distribution with standard deviation 0.05 ounce and if only 3% of the jars are to contain less than 6 ounce of coffee what must be the mean fill of these jars?
4. Find the mean and s.d. of a normal distribution of marks in an examination where 58% of the candidates obtained marks below 75, 4% got above 80 and the rest

between 75 and 80( for a S.N.V. the area under the curve between

*z*  0.2 is 0.16

and between *z*  1.8 is 92).

1. In a distribution exactly normal 7% of items are under 35 and 89% are under 63. What are the mean and s.d.?
2. In a distribution exactly normal, 10.03% of the items are under 25 kilogram weight and 89.97% of the items are under 70 kilograms weight. What are the mean and s.d. of the distribution?
3. The mean yield for one-acre plot is 662 kilos with a s.d. 32 kilos. Assuming normal distribution , how many one-acre plots in a batch of 1,000 plots would you expect to have yield (i) over 700 kilos, (ii) below 650 kilos, and (iii) what is the lowest yield of the best 100 plots?
4. X is normally distributed and the mean of X is 12 and s.d. is 4. Find out the probabilities of the following :

(a) i) *X*  20, ii) *X*  20 , and iii) 0  *X*  12,

1. find *x* ' , when *P**X*  *x*'  0.24 ,
2. find *x* ' & *x* ' when *P**x* '  *X*  *x* '  0.50 and

0

1

0

1

1

*P**X*  *x* '  0.25.