4 THEORETICAL DISTRIBUTIONS

TRY YOURSELF - 1

1. Theoretical distribution is a
   (a) Random distribution (b) Standard distribution
   (c) Probability distribution (d) None

Sol. (c) is correct

2. Probability function is known as
   (a) Frequency function (b) Continuous function
   (c) Discrete function (d) None

Sol. (a) is correct

3. The no. of points obtained in a single throw of an unbiased dice follow:
   (a) Binomial distribution (b) Poisson distribution
   (c) Uniform distribution (d) None

Sol. (c) is correct

4. When there are a fixed number of repeated trial of any experiments under identical conditions for which only one of two mutually exclusive outcomes, success or failure can result in each trial then
   (a) Normal distribution (b) Binomial distribution
   (c) Poisson distribution (d) None is used

Sol. (b) is correct

5. The method usually applied for fitting a binomial distribution is known as
   (a) Method of least square (b) Method of moments
   (c) Method of probability distribution (d) Method of distributions

Sol. (b) is correct

6. _____ is / are Bi-parametric distribution(s).
   (a) Binomial (b) Poisson
   (c) Normal (d) Both (a) & (c)

Sol. (d) is correct

7. A Binomial distribution is _____ . The parameter(s) are -
   (a) Biparametric, n and q (b) Biparametric, n and p A
   (c) Uniparametric, p (d) Uniparametric, q

Sol. (b) is correct

8. For n independent trials in Binomial distribution the sum of the powers of p and q is always _____, whatever be the no. of success.
(a) n (b) Less than n
(c) Greater than n (d) Cannot be determined

Sol. (a) is correct

9. In Binomial distribution 'p' denotes Probability of
(a) Success (b) Failure (c) Both (d) None

Sol. (a) is correct

10. In Binomial distribution 'n' means
(a) No. of trials of the experiment (b) The probability of getting success
(c) No. of success (d) None

Sol. (a) is correct

11. Standard deviation of binomial distribution is
(a) Square of npq (b) Square root of npq
(c) Square of np (d) Square root of np

Sol. (b) is correct

12. In Binomial distribution
(a) Mean is greater than variance . (b) Mean is less than variance
(c) Mean is equal to variance (d) None

Sol. (a) is correct

13. Binomial distribution is symmetrical is
(a) p>q (b) p<q (c) p=q=0.50 (d) None

Sol. (c) is correct

14. When 'p' = 0.5, the binomial distribution is
(a) Asymmetrical (b) Symmetric (c) Both (d) None

Sol. (b) is correct

15. When 'p' is large than 0.5, the binomial distribution is
(a) Asymmetrical (b) Symmetrical (c) Both (d) None

Sol. (a) is correct

16. When p=0.1 the binomial distribution is skewed to the
(a) Left (b) Right (c) Both (d) None

Sol. (a) is correct

TRY YOURSELF - 2

1. When the no. of trials is large then
   (a) Normal (b) Poisson
   (c) Binomial (d) None distribution is used

Sol. (b) is correct

2. Poisson distribution is a _____ probability distribution.
   (a) Discrete (b) Continuous (c) Both (d) None

Sol. (a) is correct

3. _____ distribution is sometimes known as the "distribution of rare events".
   (a) Poisson (b) Normal (c) Binomial (d) None

Sol. (a) is correct

4. For Poisson fitting to an observed frequency distribution,
   (a) We equate the Poisson parameter to the mean of the frequency distribution
   (b) We equate the Poisson parameter to the median of the distribution
   (c) We equate the Poisson parameter to the mode of the distribution
   (d) None of these

Sol. (a) is correct

5. In Poisson distribution, np is
   (a) Finite (b) Infinite (c) 0 (d) None

Sol. (a) is correct

6. In Poisson distribution -
   (a) Mean and SD are equal (b) Mean, Variance are equal
   (c) SD and Variance are equal (d) Both (a) and (b)

Sol. (b) is correct

7. Standard deviation of poisson distribution is
   (a) m (b) m^2 (c) $\sqrt{M}$ (d) $\frac{1}{\sqrt{M}}$

Sol. (c) is correct

8. Poisson distribution may be
   (a) Unimodal (b) Bimodal
   (c) Multi-modal (d) Either (a) or (b)

Sol. (d) is correct

9. In Poisson distribution, probability of success is very close to
(a) 1 (b) -1 (c) 0 (d) None
Sol. (c) is correct

10. Poisson distribution may be
(a) Always symmetric (b) Always positively skewed
(c) Always negatively skewed (d) Symmetric only when m = 2
Sol. (b) is correct

11. The Poisson distribution tends to be symmetrical if the mean value is
(a) High (b) Low (c) Zero (d) None
Sol. (a) is correct

12. No. of radio-active atoms decaying in a given interval of time is an example of
(a) Binomial distribution (b) Normal distribution
(c) Poisson distribution (d) None
Sol. (c) is correct

13. Number of misprints per page of a thick book follows
(a) Normal distribution (b) Poisson distribution
(c) Binomial distribution (d) Standard normal distribution
Sol. (b) is correct

14. The standard deviation of a Poisson variate is 1.732. What is the probability that the variable lies between -2.3 to 3.68?
(a) 0.55 (b) 0.65 (c) 0.75 (d) 0.85
Sol. S.D = 1.732

$\therefore$ S.D = $\sqrt{3}$

$\sqrt{M} = \sqrt{3}$

$\therefore$ M = 3

P (-2.3X < 3.68) = P(X = 0) + P(X=1) + P(X=2) + P(X=3)

$$= e^{-m}\left[\frac{m}{o!}+\frac{m^{1}}{7!}+\frac{m^{2}}{2!}+\frac{m^{3}}{3!}\right]^{0}$$

$$= e^{-3} = \left[\frac{1}{1}+\frac{3}{1}+\frac{9}{2}+\frac{27}{6}\right]$$

$$= \frac{1}{e^3}\ (1+3+4.5+4.5]$$

$$= \frac{13}{2.71828^{\ 3}}$$

= 0.647

≈ 0.65

∴ (b) is correct

15. For a Poisson variate X, P(X=1) = P(X=2). What is the mean of X?

(a) 1.00 (b) 1.50 (c) 2.00 (d) 2.50

Sol. P (X = 1) = P (X=2)

$$\frac{e^{-m}\ m^{\ 1}}{1!} = \frac{e^{-m}\ m^{\ 2}}{2!}$$

$$\frac{m}{1} = \frac{m^2}{2}$$

$$\frac{m^2}{2} = \frac{2}{1}$$

M = 2

∴ (c) is correct

16. Find the mean and standard deviation of x where x is a Poisson variate satisfying the condition P(x = 2) = P(x = 3).

(a) 2 (b) 3 (c) 4 (d) 5

Sol. P (X = 2) = P (X = 3)

$$\frac{e^{-m}\ m^{\ 2}}{2!} = \frac{e-m\ m^{\ 3}}{3!}$$

$$\frac{3!}{2!} = \frac{m^3}{m^2}$$

M = 3

∴ (b) is correct

17. The probability that a random variable x following Poisson distribution would assume a positive value is $(1 - e^{-2\cdot7})$. What is the mode of the distribution?

(a) 2 (b) 3 (c) 4 (d) 5

Sol. P (X > 0) = 1 - $e^{-2.7}$

1 – P (X = 0) = 1 - $e^{-2.7}$

$1 - \frac{e^{-m}\ m^{0}}{0!} = 1 - e^{-2.7}$

$1 - e^{-m} = 1 - e^{-2.7}$

By comparing

M = 2.7 (Non-Integer)

Mode = largest integer of m

∴ Mode = 2

∴ (a) is correct

18. X is a Poisson variate satisfying the following relation: P (X = 2) - 9P(x = 4) + 90P (X = 6).

What is the standard deviation of X?

(a) 1 (b) 2 (c) 1.55 (d) 1.87

Sol. P(X = 2) – 9 P(X = 4) = 90 P (X = 6)

$$\left[\frac{m^2}{2} - 9\frac{m^4}{24}\right] = 90\left[\frac{m^6}{720}\right]$$

$$\frac{m^2}{2}\left[1 - \frac{3m^4}{4}\right] = \frac{m^6}{8}$$

$$m^2\frac{[4-3m^4)}{8} = m^6$$

$4m^4 = 4$

$m^4 = 1$

m = 1 $\frac{m^2}{2} = \frac{9m^4}{24} + \frac{90m^6}{720}$

$4m^2 = 2\ 3 + m^2$

$m^4 + 3m^2 - 4 = 0$

$m^4 + 4$

$m^2 + 4\quad m^2 - 1 = 0$

TRY YOURSELF - 3

1. Which of the following is false in case of Normal Distribution? ,
   (a) It is Multi model (b) Mean = Median = Mode
   (c) It is Symmetric (d) Total area is 1

Sol. (a) is correct

2. In continuous probability distribution F(x) is called
   (a) Frequency distribution function (b) Cumulative distribution function
   (c) Probability density function (d) None

Sol. (b) is correct

3. If neither p nor q is very small but n sufficiently large, the Binomial distribution is very closely approximated by _____ distribution.
   (a) Poisson (b) Normal (c) t (d) None

Sol. (a) is correct

4. The most important continuous probability distribution is known as
   (a) Binomial distribution (b) Normal distribution
   (c) Chi-square distribution (d) Sampling distribution

Sol. (b) is correct

5. For continuous variates _____ distribution is used.
   (a) Normal (b) Poisson (c) Binomial (d) None

Sol. (a) is correct

6. Probability density function is associated with
   (a) Discrete cases (b) Continuous cases (c) Both (d) None

Sol. (b) is correct

7. Probability density function is always
   (a) Greater than 0 (b) Greater than equal to 0
   (c) Less than 0 (d) Less than equal to 0

Sol. (b) is correct

8. In continuous cases probability of the entire space is
   (a) 0 (b) -1 (c) 1 (d) None

Sol. (c) is correct

9. In discrete cases the probability of the entire space is
(a) 0 (b) 1 (c) -1 (d) None
Sol. (b) is correct

10. In Normal distribution the probability has the maximum value at the
(a) Mode (b) Mean (c) Median (d) None
Sol. (b) is correct

11. In Normal distribution, the probability decreases gradually on either side of the mean but never touches the axis.
(a) True (b) False (c) Both (d) None
Sol. (a) is correct

12. Whatever may be the parameter of distribution, it has same shape. .
(a) Normal (b) Binomial (c) Poisson (d) None
Sol. (a) is correct

13. In standard normal distribution
(a) Mean =1, SD=0 (b) Mean =1, SD =1
(c) Mean =0, SD=1 (d) Mean =0, SD=0
Sol. (c) is correct

14. Normal distribution mean, median and mode are -
(a) Equal (b) Not equal (c) Zero (d) None
Sol. (a) is correct

15. The no. of methods for fitting the normal curve is _____ . They are _____
(a) 1, Ordinate Method (b) 2, Ordinate Method and Area Method
(c) 1, Area Method (d) None
Sol. (b) is correct

16. The normal curve is
(a) Positively skewed. (b) Negatively skewed.
(c) Symmetrical. (d) All of these.
Sol. (c) is correct

HOME WORK

1. The standard Deviation of Binominal distribution is:

(a) npq (b) $\sqrt{npq}$ (c) np (d) $\sqrt{np}$

Sol. Variance = 0^2 = npq

$\therefore \sigma = SD = \sqrt{npq}$

(b) is correct

2. If a Poisson distribution is such that $P(X=2) = P(X=3)$ then the variance of the distribution is

(a) $\sqrt{3}$ (b) 3 (c) 6 (d) 9

Sol. Let mean = m = variance

$\therefore$ P(X = 2) = P(X = 3)

[$\therefore$ It follows poisson Distribution]

$$\frac{m^2 . e^{-m}}{\lfloor 2} = \frac{m^3 . e^{-m}}{\lfloor 3}$$

Or $\frac{1}{\lfloor 2} = \frac{m}{3 \times \lfloor 2}$

Or ; m = 3

$\therefore$ Variance = m = 3

$\therefore$ (b) is correct

3. Skewness of normal distribution is:

(a) Negative (b) Positive (c) Zero (d) Undefined

Sol. (c) is correct

4. For a normal distribution, the first and third quartiles are given to be 37 and 49, the mode of the distribution is

(a) 37 (b) 49 (c) 43 (d) 45

Sol. For Normal Distribution

Q_1 = 37; Q, = 49

$\therefore$ Mean $= \mu = \frac{Q_1 + Q_3}{2} = \frac{37+49}{2} = 43$

$\therefore$ It is Normally Distributed

$\therefore$ Mean = Median = Mode = 43

∴ (c) is correct.

5. The standard deviation of a Poisson variate X is 1.732. The $P[-2.9 < X < 3.54]$ is

(a) $13e^{-3}$ (b) $9e^{-3}$ (c) $4e^{-2}$ (d) e^{-6}

Sol. Given

SD = $\sqrt{np} = \sqrt{m} = 1.732 = \sqrt{3}$

∴ m=3

$$P(x = r) = \frac{m^r . e^{-m}}{\lfloor r}$$

Where r = 0,1,2,3,_____(Whole No.)

$P = (-2.9 < X < 3.54)$

= P (Whole Nos. b/w - 2.9 & 3.54)

= P (X = 0) + P(X = 1) + P(X = 2) + P(X = 3)

$$= \frac{m^0 . e^{-m}}{\lfloor 0} + \frac{m^1 . e^{-m}}{\lfloor 1} + \frac{m^2 . e^{-m}}{\lfloor 2} + \frac{m^3 . e^{-m}}{\lfloor 3}$$

$$= e^{-m}\left(m^0 + \frac{m}{1} + \frac{m^2}{2} + \frac{m^3}{6}\right)$$

$$= e^{-3}\left(1 + \frac{3}{1} + \frac{3^2}{2} + \frac{3^3}{6}\right)$$

$= e^{-3} \times 13 = 13e^{-3}$

∴ (a) is correct.

6. The variance of a normal distribution is given to be 16. The mean deviation about mode is

(a) 3.2 (b) 8 (c) 12.8 (d) 12

Sol. Var = $\sigma^2 = 16$

$\sigma = 4$

∴ MD = $0.8.\sigma$

$= 0.8 \times 4 = 3.2$

∴ MD about Mean Median = Mode = 3.2

$(\overline{X} = M_e = M_0)$ because it is Normally distributed

∴ (a) is correct.

7. The mean of binomial distribution is
   (a) Always less than its variance
   (b) Always more than its variance
   (c) Always equal to its variance
   (d) Always equal to its standard deviation

Sol. (b) is correct

8. The binomial distribution, having mean and standard deviation as 3 and 1.5. has number of trials equal to
   (a) 3 (b) 6 (c) 8 (d) 12

Sol. Mean = np = 3 (given)

and $\sqrt{npq}$ = 1.5

$\therefore$ npq = $(1.5)^2$ = 2.25

or 3q = 2.25

$\therefore$ q = $\frac{2.25}{3}$ = 0.75

$\therefore$ p = 1- q = 1 - 0.75 = 0.25

$\therefore$ np = 3

or $n = \frac{3}{p}$ $\therefore$ $n = \frac{3}{0.25} = 12$

$\therefore$ (d) is correct

9. If X is a binomial variate with p= 1/3, for the experiment of 90 trails, then the standard deviation is equal to
   (a) $-\sqrt{5}$ (b) $\sqrt{5}$ (c) $\sqrt[2]{5}$ (d) $\sqrt{15}$

Sol. Given $p = \frac{1}{3} \Rightarrow q = 1-p = 1-\frac{1}{3} = \frac{2}{3}$

Variance $= \sigma^2 = npq = 90.\frac{1}{3}.\frac{2}{3} = 20$

SD $= \sigma = \sqrt{20} = \sqrt{4\times5} = \sqrt[2]{5}$

$\therefore$ (c) is correct

10. If X is a Poisson variate such that P(x=1) = 0.7, P(x = 2)=0.3, then P(x=0) =
   (a) $e^{6/7}$ (b) $e^{-6/7}$ (c) $e^{-2/3}$ (d) $e^{-1/3}$

Sol. Given

P (X = 1) = 0.7

or $\frac{m^1e^{-m}}{\lfloor 1} = me^{-m} = 0.7$ (1)

and ∵ $p(x=2) = \frac{m^2e^{-m}}{\lfloor 2} m = \frac{m^2e^{-m}}{2} = 0.3$ (2)

Eqn. (2), Eqn. (1); we get

$\frac{m^2e^{-m}}{2.me^{-m}} = \frac{0.3}{0.7}$

Or $\frac{m}{2} = \frac{3}{7} \Rightarrow m = \frac{6}{7}$

∴ $p(x=0) = \frac{m^0e^{-m}}{\lfloor 0} = 1\frac{e^{-6/7}}{1}$

$= e^{-6/7}$

∴ (b) is correct

11. In normal distribution, Mean ,Median, and Mode are

(a) Zero (b) Not Equal (c) Equal (d) Null

Sol. (c) is correct

12. Which one of the following is an uniparametric distribution

(a) Poisson (b) Normal (c) Binomial (d) Hyper geometric

Sol. (a) is correct

13. The quartile deviation of a normal distribution with mean 10 and standard deviation 4 is.....

(a) 54.24 (b) 23.20 (c) 0.275 (d) 2.70

Sol. QD = Quartile Deviation

= 0.675.s

= 0.675 × 4 = 2.70

∴ (d) is correct.

14. If x is a poisson variate with mean m then $z = \frac{z-m}{\sqrt{m}}$ follows ____ distribution:

(a) Normal (b) Binomial (c) Bernoulli (d) None of the above

Sol. (a) is correct

15.In Normal distribution 95% observation lies between _____ & _____ :

(a) $(\mu-2\sigma, \mu+2\sigma)$ (b) $(\mu-3\sigma, \mu+3\sigma)$

(c) $(\mu-1.96\sigma,\ \mu+1.96\sigma)$ (d) $(\mu-2.58\sigma, \mu\ +2.58\sigma)$

Sol. (c) is correct

16. When a coin is tossed 10 times then the Probability Distribution of the number of Heads forms a -

(a) Normal Distribution (b) Poisson distribution

(c) Binomial distribution (d) None is used

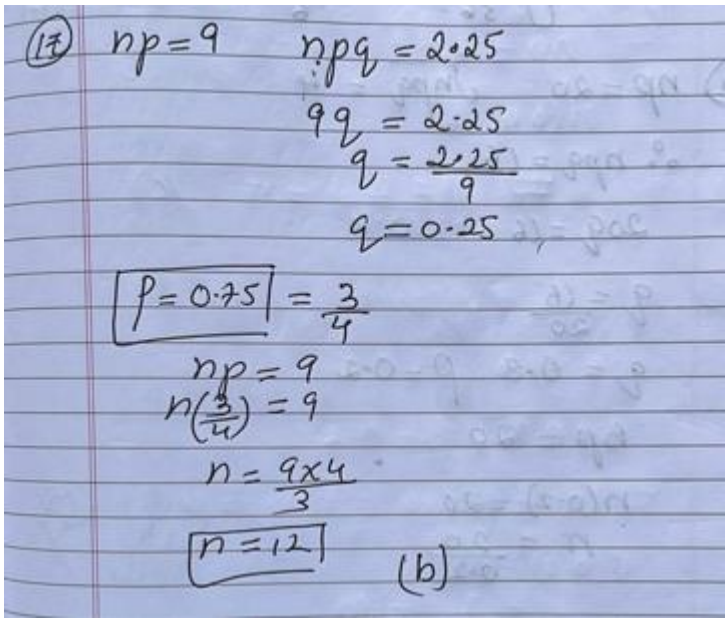
Sol. (c) is correct

17. If in Binomial distribution np=9 and npq = 2.25 then p and n are equal to is equal to

(a) 0.25, 36 (b) 0.75, 12

(c) 1, 9 (d) None

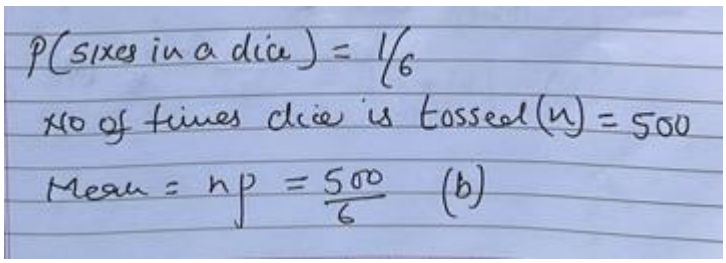
Sol.



18. An unbiased dice is tossed 500 times. The mean of the no. of 'Sixes' in these 500 tosses is

(a) 50/6 (b) 500/6 (c) 5/6 (d) None

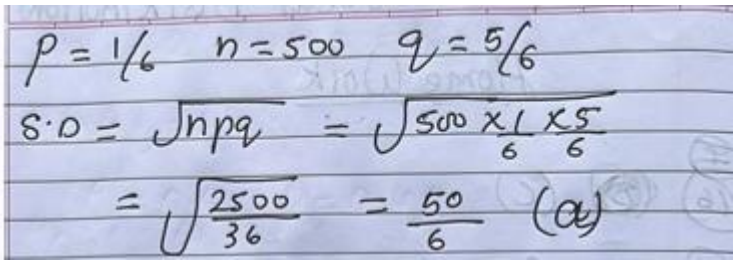
Sol.



19. An unbiased dice is tossed 500 times. The Standard deviation of the no. of 'sixes' in these 500 tossed is

(a) 50/6 (b) 500/6 (c) 5/6 (d) None

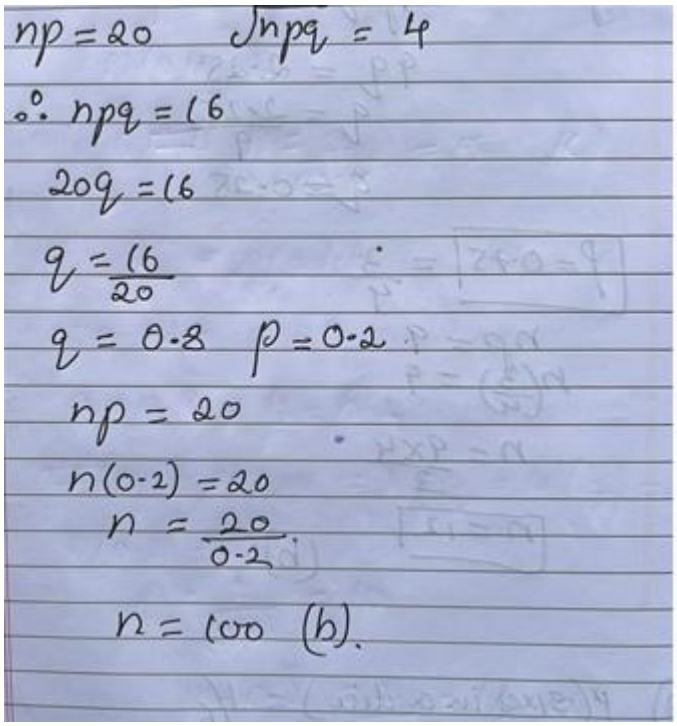
Sol.



20. In Binomial distribution if mean = 20, SD=4 then π is equal to

(a) 80 (b) 100 (c) 90 (d) None

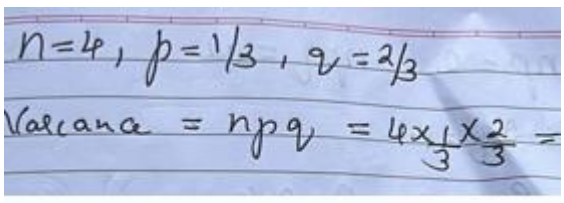
Sol.



21. In Binomial distribution, if n=4 and p=1/3 then the value of variance is

(a) 8/3 (b) 8/9 (c) 4/3 (d) None

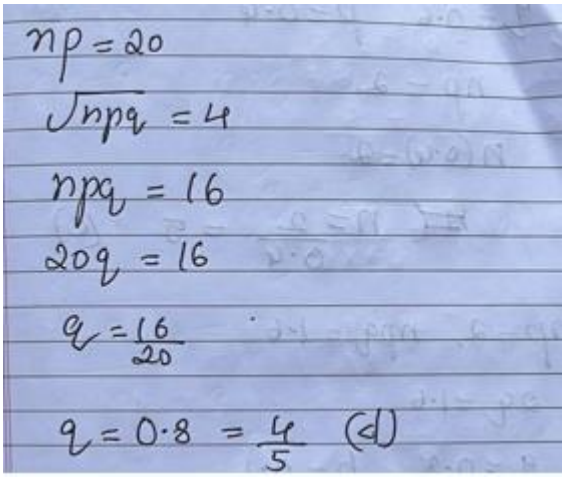
Sol.



22. In Binomial distribution if mean = 20, SD=4 then q is equal to

(a) 2/5 (b) 3/8 (c) 1/5 (d) 4/5

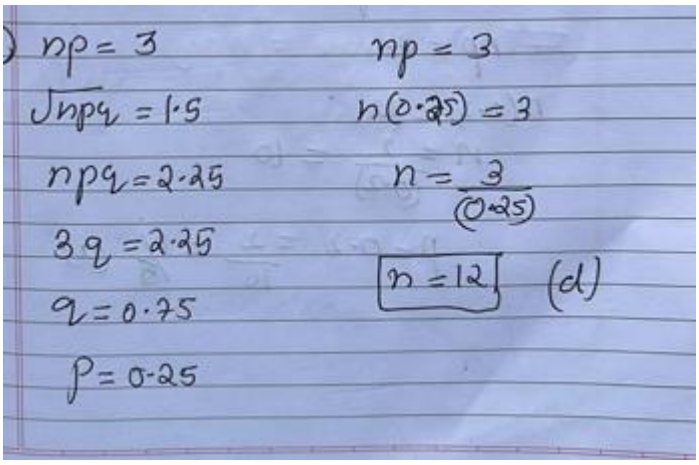
Sol.



23. What is the no. of trials of a binomial distribution having mean and SD as 3 and 1.5 respectively?

(a) 2 (b) 4 (c) 8 (d) 12

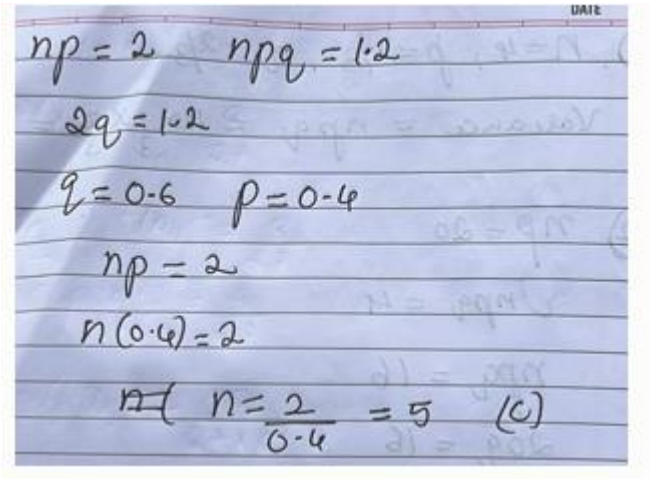
Sol.



24. A random variable x follows Binomial distribution with E(X) = 2 and V(X)=1,2. Then the value of n is

(a) 8 (b) 2 (c) 5 (d) None

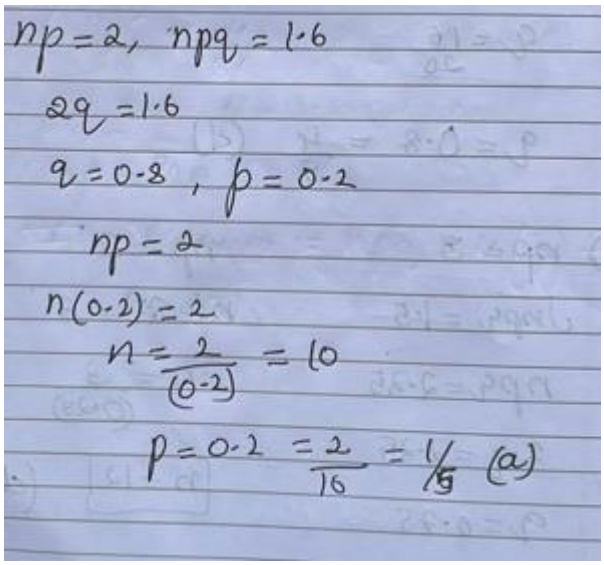
Sol.



25. A random variable x follows Binomial distribution with mean 2 and variance 1.6. then the value of p is

(a) 1/5 (b) 4/5 (c) 3/5 (d) None

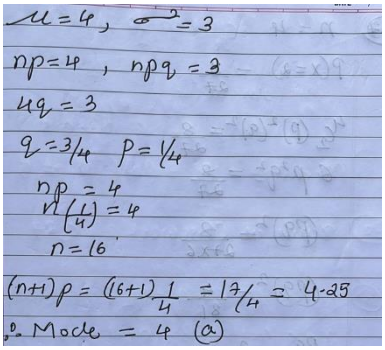
Sol.



26. In Binomial Distribution, $\mu = 4$, $\sigma^2 = 3$, then mode =

(a) 4 (b) 4.25 (c) 4.5 (d) 4.1

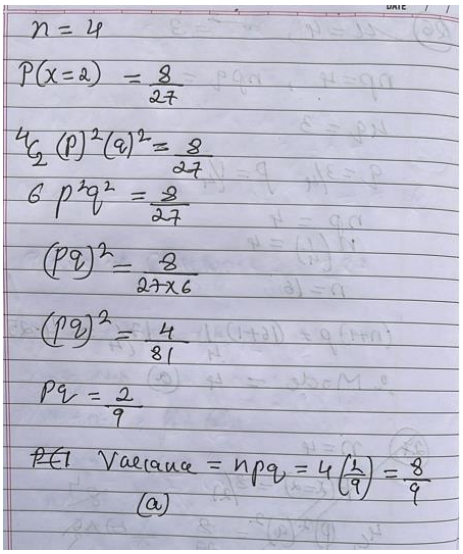
Sol.



27. X is binomial random variable. In a game of 4 trials P(x=2) = 8/27, then the variance is -

(a) 8/9 (b) 9/8 (c) 3/8 (d) 8/3

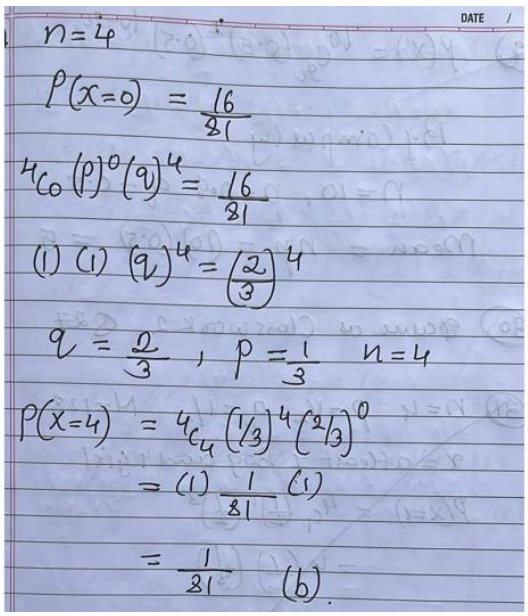
Sol.



28. If in a binomial distribution n = 4, P(X = 0) = 16/81, then P(X = 4) is

(a) 1/16 (b) 1/81 (c) 1/27 (d) 1/8

Sol.

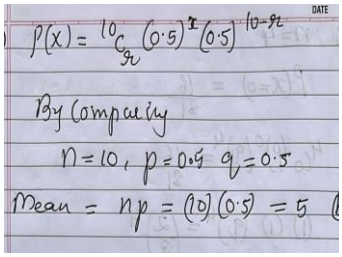


29. For a binomial distribution $P(x) = {}^{10}C_r(0.5)^y(0.5)^{10-r}$, r = 0,1, 2,...10, the mean value is

(a) 4 (b) 5 (c) 10 (d) 15

Sol.

Sol.



Sol.

30. What is the probability of making 3 correct guesses in 5 True-False answer type questions?

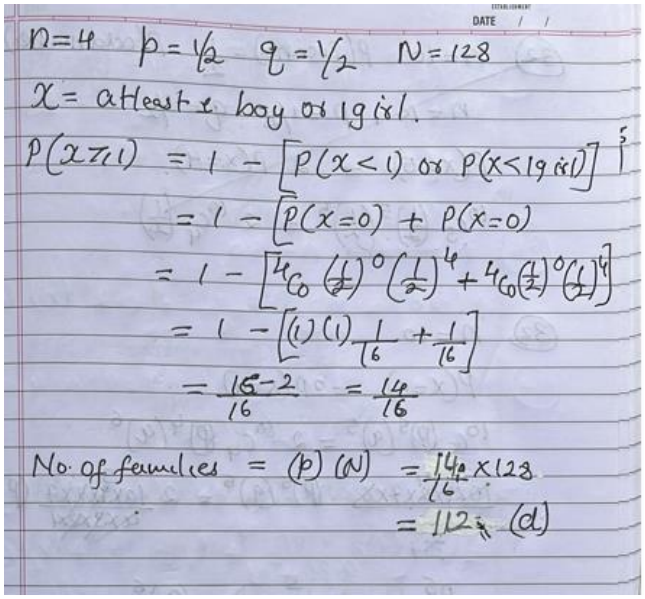
(a)0.3125 (b) 0.5676 (c) 0.6875 (d) 0.4325

Sol. Same as Classwork 2 : Q.27

31. Out of 128 families with 4 children each, how many are expected to have atleast one boy and one girl?

(a) 100 (b) 105 (c) 108 (d) 112

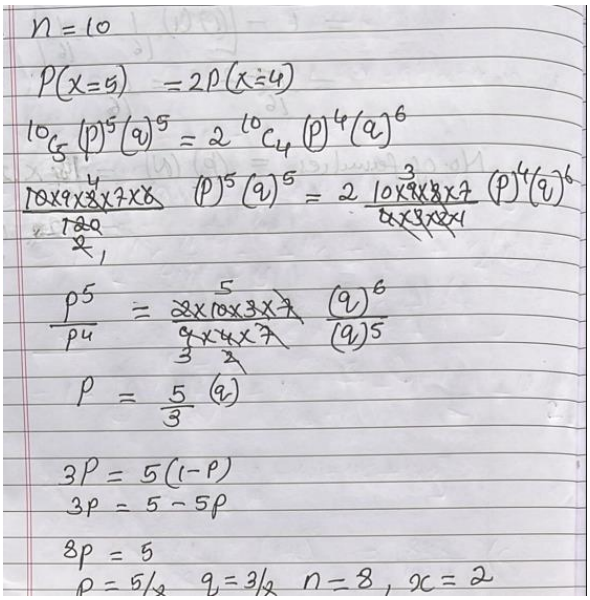
Sol.

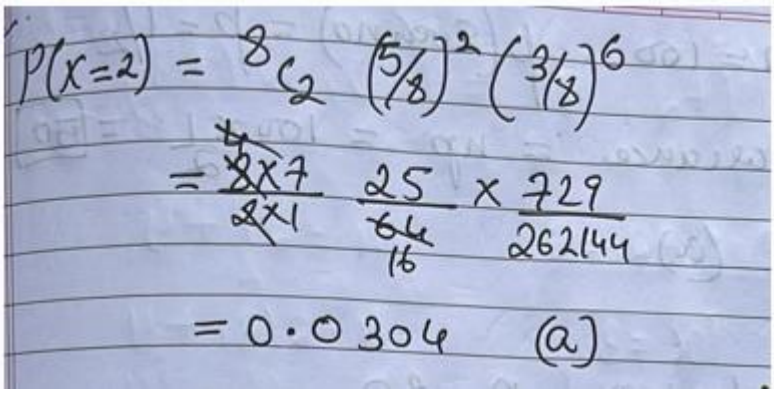


32. In 10 independent rollings of a biased dice, the probability that an even number will appear 5 times is twice the probability that an even number will appear 4 times. What is the probability that an even number will appear twice when the die is rolled 8 times?

(a) 0.0304 (b) 0.1243 (c) 0.2315 (d) 0.1926

Sol.





33. A man tosses a fair coin 10 times, the probability that he has heads on the first five tosses is

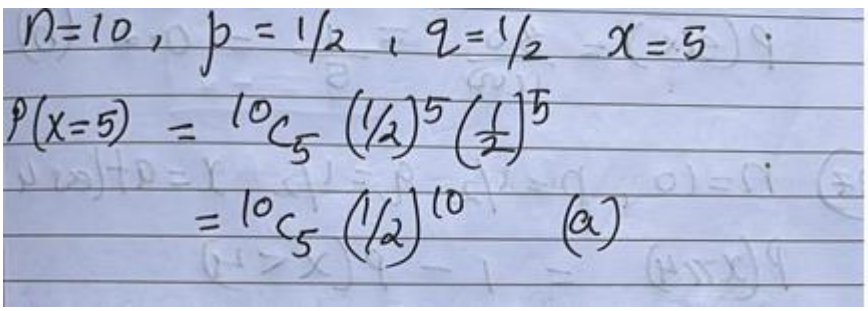
(a) $^{10}C_5 \left(\frac{1}{2}\right)^{10}$

(b) $\left(\frac{1}{2}\right)^{10}$

(c) $^{5}C_1 \left(\frac{1}{2}\right)^{10}$

(d) $\left(\frac{1}{2}\right)^{5}$

Sol.

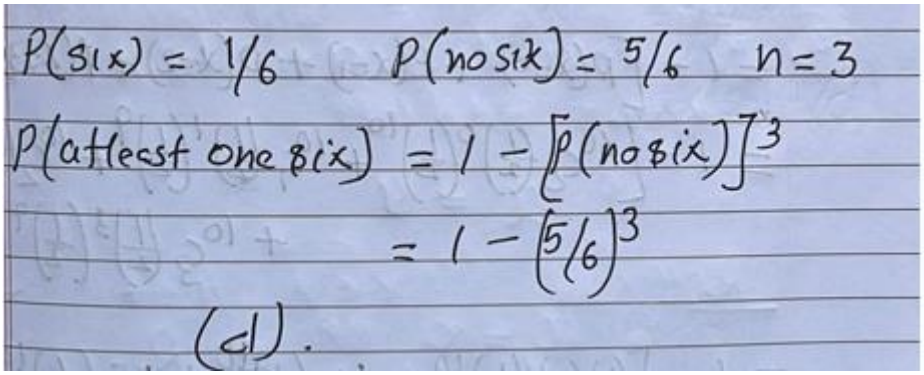


34. What is the probability of having atleast one 'six' from 3 throws of a perfect die?

(a) 5/6 (b) $(5/6)^3$

(c) $1 - (1/6)^3$ (d) $1 - (5/6)^3$

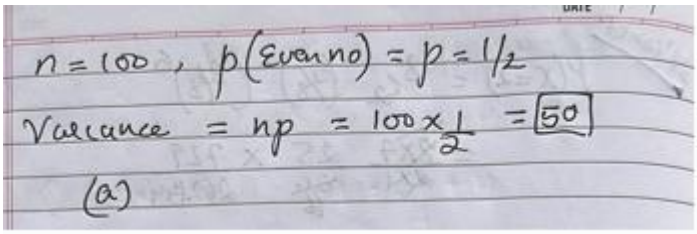
Sol.



35. A die is thrown 100 times. If getting an even number is considered a success, then the variance of the number of successes is

(a) 50 (b) 25 (c) 10 (d) 100

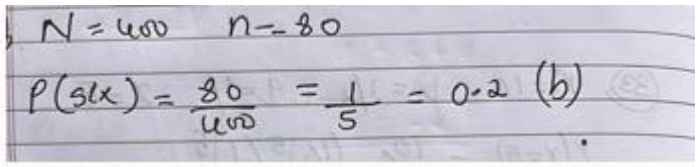
Sol.



36. A die was thrown 400 times and 'six' resulted 80 times then observed value of proportion is

(a) 0.4 (b) 0.2 (c) 5 (d) None of these

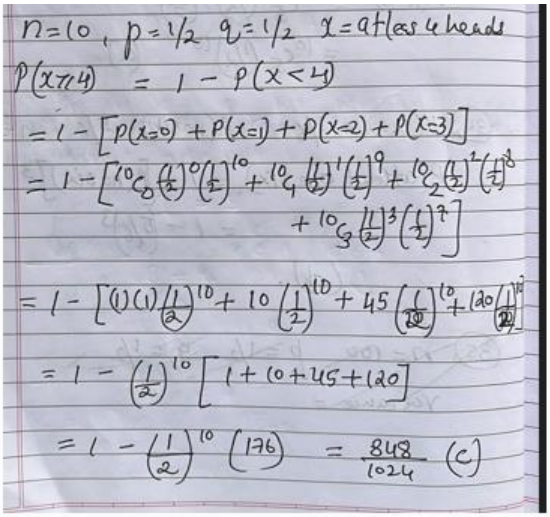
Sol.



37. A coin is tossed 10 times. Assuming the coin to be unbiased, what is the probability of getting at least 4 heads?

(a) $\frac{563}{1024}$ (b) $\frac{758}{1024}$ (c) $\frac{848}{1024}$ (d) $\frac{663}{1024}$

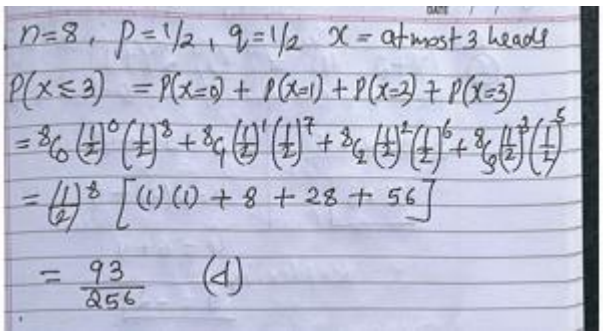
Sol.



38. A coin is tossed 8 times. Assuming the coin to be unbiased, what is the probability of getting at most 3 heads?

(a) $\frac{23}{64}$ (b) $\frac{11}{64}$ (c) $\frac{19}{64}$ (d) None of these

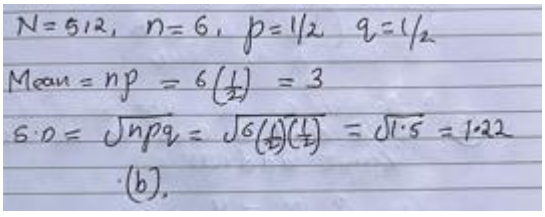
Sol.



39. 6 coins are tossed 512 times. Also, compute the mean and SD of the number of heads.

(a) 2 and 1.33 (b) 3 and 1.22 (c) 4and 1.55 (d) 2 and 1.11

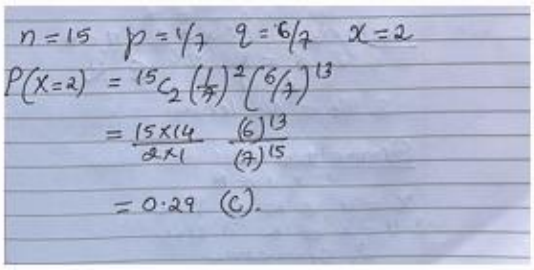
Sol.



40. If 15 dates are selected at random, what is the probability of getting two Sundays?

(a) 0.36 (b) 0.44 (c) 0.29 (d) 0.57

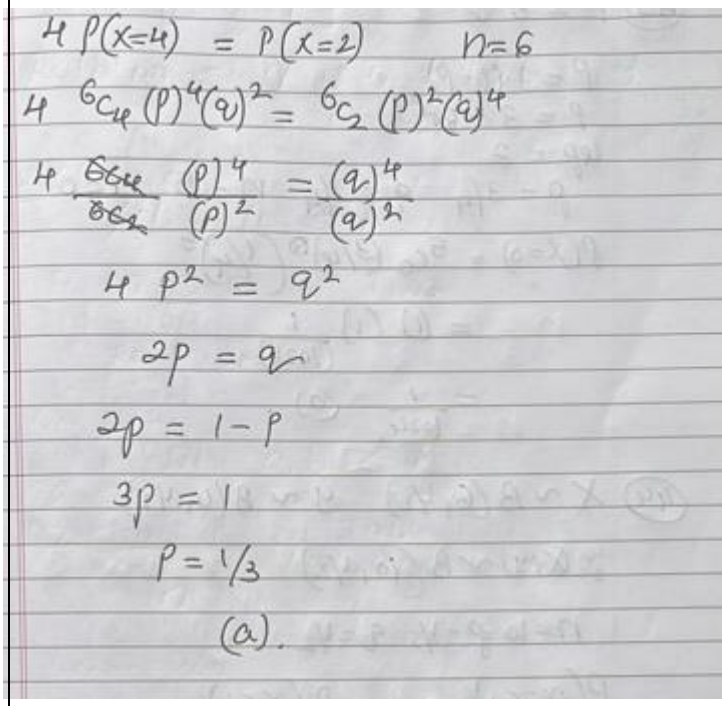
Sol.



41. Find the probability of success for the binomial distribution satisfying the following relation, 4 P(x = 4) = P(x = 2) and having the other parameter as six.

(a) $\frac{1}{3}$ (b) $\frac{1}{5}$ (c) $\frac{3}{4}$ (d) None of these

Sol.



42. Find the binomial distribution for which mean and standard deviation are 6 and 2 respectlvely.

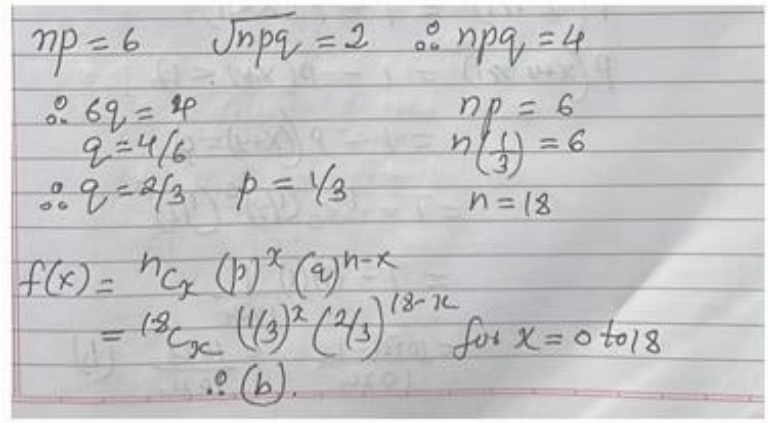
(a) $f(x) = {}^{15}C_x(\frac{1}{3})^x(\frac{2}{3})^{15-x}$ for $x = 0$ to 15

(b) $f(x) = {}^{18}C_x(\frac{1}{3})^x(\frac{2}{3})^{18-x}$ for $x = 0$ to 18

(c)| $f(x) = {}^{19}C_x(\frac{1}{3})^x(\frac{2}{3})^{19-x}$ for $x = 0$ to 19

(d) $f(x) = {}^{17}C_x(\frac{1}{3})^x(\frac{2}{3})^{17-x}$ for $x = 0$ to 17

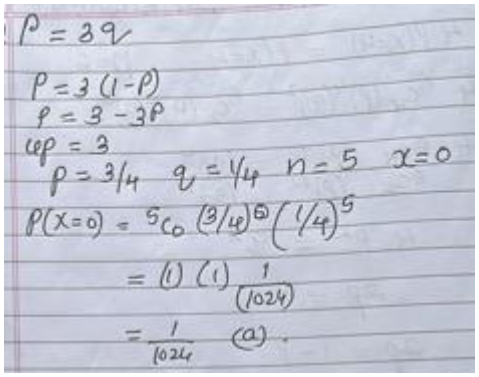
Sol.



43. An experiment succeeds thrice as after it fails. If the experiment is repeated 5 times, what is the probability of having no success at all?

(a) $\frac{1}{1024}$ (b) $\frac{3}{1024}$ (c) $\frac{5}{1024}$ (d) None of thes

Sol.

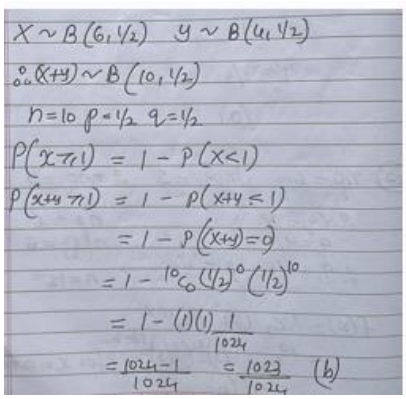


44. If x and y are 2 independent variables with parameters 6 and $\frac{1}{2}$ and 4 and $\frac{1}{2}$ respectively, what is P(x + y ≥ 1) ?

(a) 1/1024 (b) 1023/1024

(c) 523/1024 (d) None of these

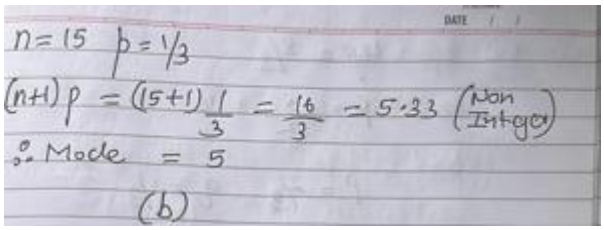
Sol.



45. If x is a binomial variate with parameter 15 and 1/3, what is the value of mode of the distribution?

(a) 5 and 6 (b) 5 (c) 5.50 (d) 6

Sol.



46. X is a binomial variable such that 2 P(X=2) = P(X=3) and mean of X is known to be 10/3. What would be the probability that X assumes at most the value 2?

(a) 16/81 (b) 17/81 (c) 47/2473 (d) 46/243

Sol. $Np = 10/3$

$2\,P(X=2) = P(X=3)$

$2\,{}^{n}C_2\,(P)^2(q)^{n-2} = {}^{n}C_3\,(P)^3(q)^{n-3}$

$= \frac{(q)^{n-2}}{(q)^{n-3}} = \frac{n(n-1)(n-2)}{3\times2\times1}\,\frac{(P)^3}{(P)^2}$

$(q)^{n-2-n+3} = \frac{(n-2)}{6}(P)$

$6(q) = np - 2P$

$6(1-P) = \frac{10}{3} - 2P$

$6 - 6P = \frac{10}{3} - 2P$

$6 - \frac{10}{3} = 6P - 2P$

$\frac{18-10}{3} = 4p$

$4p = 8/3$

$P = \frac{8}{12}$

$P = 2/3$ $q = 1/3$

$np = \frac{10}{3}$

$n\left(\frac{2}{3}\right) = \frac{10}{3}$

$n = \frac{10}{3} \times \frac{3}{2}$

$n = 5$

$n = 5$, $p = \frac{2}{3}$, $q = \frac{1}{3}$ x = atmost 2

$P(x \le 2) = P(X=0) + P(X=1) + P(X=2)$

$= 5c_0 \left(\frac{2}{3}\right)^0 \left(\frac{1}{3}\right)^5 + 5c_1 \left(\frac{2}{3}\right)\left(\frac{1}{3}\right)^4 + 5c_2 \left(\frac{2}{3}\right)^2 \left(\frac{1}{3}\right)^3$

$= (1)\,(1)\ \frac{1}{243} + \frac{5\times 2}{243} + \frac{10\times 4}{243}$

$= \frac{1+10+40}{243}$

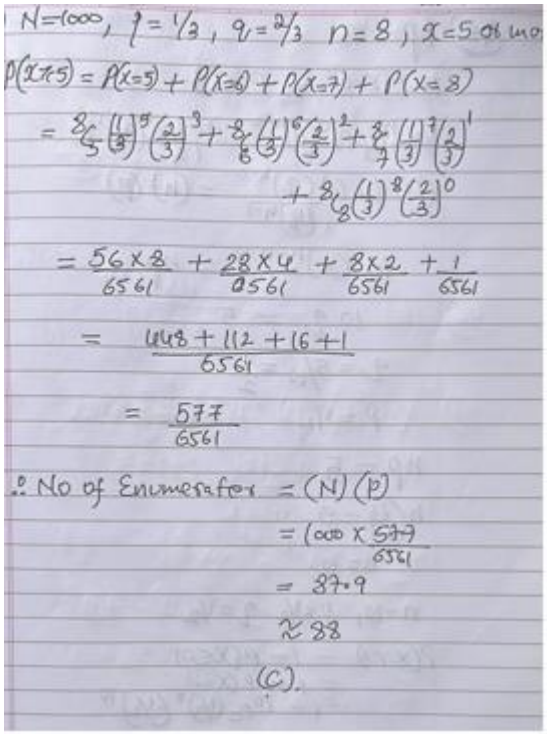
$= \frac{51}{243}$

$= \frac{17}{81}$

47. Assuming that one-third of the population are tea drinkers and each of 1000 enumerators takes a sample of 8 individuals to find out whether they are tea drinkers or not, how many enumerators are expected to report that five or more people are tea drinkers?

(a) 100 (b) 95 (c) 88 (d) 90

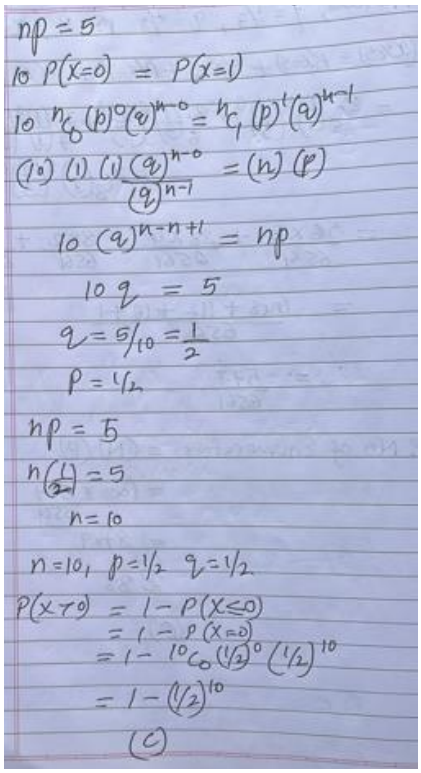
Sol.



48. If a random variable X follows binomial distribution with mean as 5 and satisfying the condition 10 P(X=0) = P(X=1), what is the value of P(X>0)?

(a) $(½)^{10}$ (b) $(½)^{10}-1$ (c) $1-(½)^{10}$ (d) 0

Sol.



49. Fit a binomial distribution to the following data:

X	0	1	2	3	4	5
f	3	6	10	8	3	2

(a) $f(x)={}^5C_x\ (0.65)^x\ (0.35)^5 \rightarrow$ for x = 0 to 5

(b) $f(x)={}^5C_x\ (0.45)^x\ (0.55)^{5-x}$ for x = 0 to 5

(c) $f(x)={}^5C_x\ (0.25)^x\ (0.75)^{5-x}$ for x – 0 to 5

(d) $f(x)={}^5C_x\ (0.15)^x\ (0.85)^{5-x}$ for x = 0 to5

Sol. (b) is correct

50. If a binomial distribution is fitted to the following data:

X	0	1	2	3	4
F	16	25	32	17	10

Then the sum of the expected frequencies for x=2, 3 and 4 would be

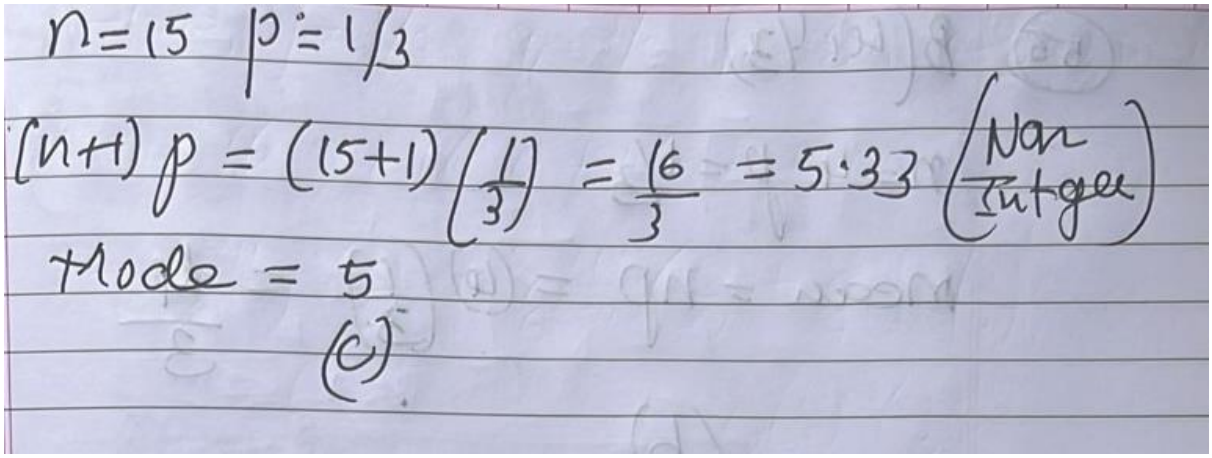
(a) 58 (b) 59 (c) 60 (d) 61

Sol. (b) is correct

51. For a binominal distribution, the parameters are 15 and 1/3 Find mode:

(a) 5 and 6 (b) 5.5 (c) 5 (d) 6

Sol.



52. Standard Deviation of binominal distribution is-

(a) npq (b) $(npq)^2$ (c) $\sqrt{npq}$ (d) $n^2p^2q^2$

Sol. (c) is correct

53. In the Binomial distribution the parameters are n and p, then X assumes value:

(a) Between 0 and n (b) Between o and n both inclusive

(c) Between 0 and 1 (d) Between o and ∞

Sol. (b) is correct

54. For a Binomial distribution mean is 4 and variance is 3 then, 3rd central moment is

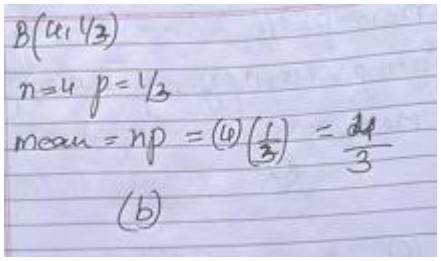
(a) 2.8875 (b) 0.2887 (c) 28.875 (d) 288.75

Sol. (b) is correct

55. The mean of the binomial distribution $B\left(4, \frac{1}{3}\right)$ is equal to

(a) $\frac{3}{5}$ (b) $\frac{4}{3}$ (c) $\frac{8}{3}$ (d) $\frac{3}{4}$

Sol.



56. _____ distribution is a limiting case of Binomial distribution

(a) Normal (b) Poisson (c) Both (d) None

Sol. (b) is correct

57. If x ~ B (5,p) and p (x = 2) = 0.4362 and p (x = 3) = 0.2181, then p =

(a) 3/4 (b) 1/3 (c) 2/3 (d) 1/4

Sol. X ~ B (5 ,P) P (X = 2) = 0.4362

P(X = 3) = 0.2181 n = 5

∵ P (X = 2) = 0.4362

5_{C_2} $(P)^2$ $(q)^3$ = 0.4362

10 $(P)^2$ = $(q)^3$ = 0.4362 (1)

∵ P (X = 3) = 0.1281

5_{C_3} $(P)^3(q)^2$ = 0.2181

10 $(P)^3(Q)^2$ = 0.2181 (2)

$$\frac{10p^3(q)^2}{10p^2(q)^3} = \frac{0.2181}{0.4362}$$

$$\frac{p}{q} = \frac{1}{2}$$

2p = q

2p = 1 p

3p = 1

P = $1/3$

(b) is correct

58. Poisson distribution approaches a Normal distribution as n

(a) Increase infinitely (b) Decrease

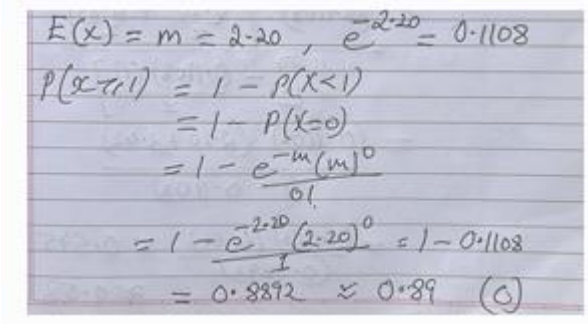
(c) Increases moderately (d) None

Sol. (a) is correct

59. A discrete random variable x follows Poisson distribution. Find the value of P(X = atleast 1) .You are given that E (x) = 2.20 and $e^{-2\cdot20}$ = 0.1108 .

(a) 0.45 (b) 0.78 (c) 0.89 (d) 0.65

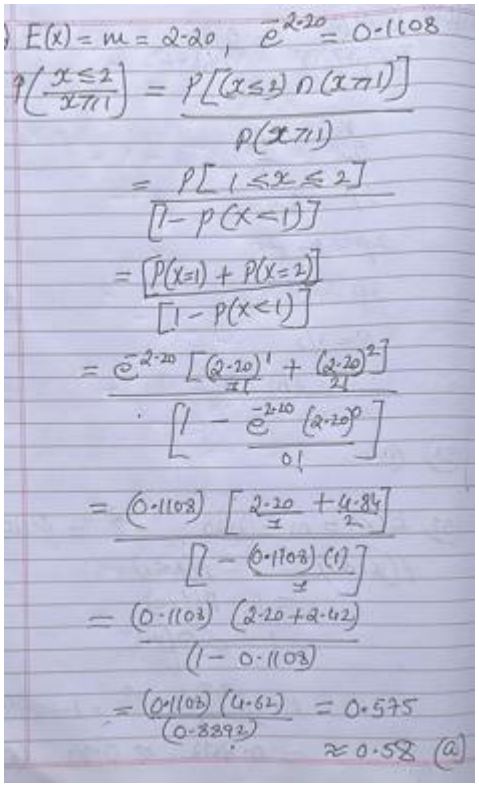
Sol.



60. A discrete random variable x follows Poisson distribution. Find the value of P(X ≤ 2/X ≥ 1) .You are given that E (x) = 2.20 and $e^{-2.20}$ = 0.1108 .

(a) 0.58 (b) 0.64 (c) 0.89 (d) 0.76

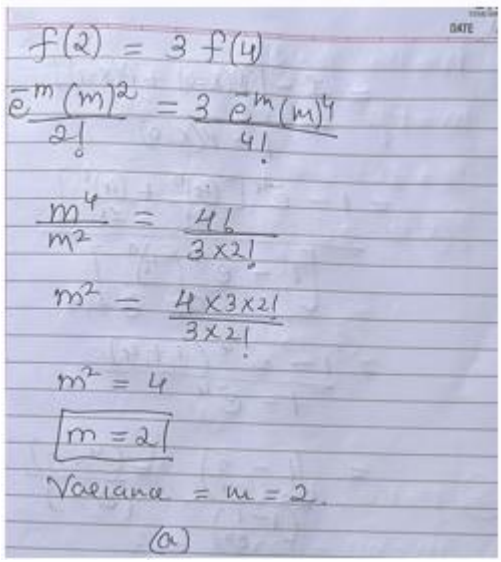
Sol.



61. If for a Poisson variable X, f(2) = 3 f(4), what is the variance of X?

(a) 2 (b) 4 (c) $\sqrt{2}$ (d) 3

Sol.



62. A random variable x follows Poisson distribution and its coefficient of variation is 50. What is the value of P(x>1/x>0)?

(a) 0.1876 (b) 0.2341 (c) 0.9254 (d) 0.8756

Sol. C.V. = 50 $\sqrt{m} = 2$

$\frac{\sigma}{x}\times 100 = 50$ m = 4

$\frac{\sqrt{m}}{m} = \frac{50}{100}$ $\frac{P(x>1)}{x>0} = \frac{P[(x>1)n(x>0)]}{P(x>0)}$

$= \frac{P[x>1]}{P(x>0)}$

$= \frac{1-P[x\le 1]}{1-P(x\le 0)}$

$= 1 - \frac{[P(x=0)+P(X=1)]}{1-P(X=0)}$

$= 1 - \frac{e-4\left[\frac{(4)^0}{0!}+\frac{(4)^1}{1!}\right]}{\left[1-\frac{e-4(4)^0}{0!}\right]}$

$= \frac{1-e^{-4}(1+4)}{1-e^{-4}}$

$= \frac{\left(1-\frac{5}{e^4}\right)}{\left(1-\frac{1}{e^4}\right)} = \frac{(e^4-5)}{(e^4-1)}$

= 0.92537

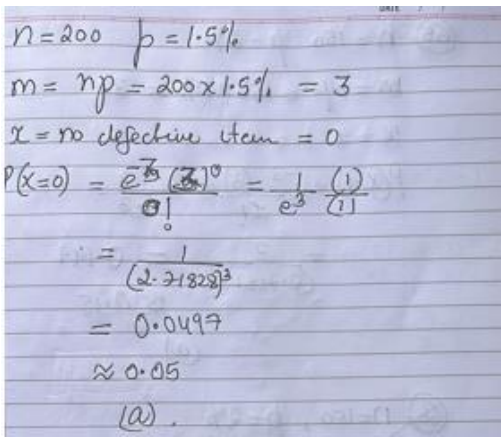
≈ 0.9254

(c) is correct

63. If 1.5% of items produced by a manufacturing units are known to be defective, what is the probability that a sample of 200 items would contain no defective item?

(a) 0.05 (b) 0.15 (c) 0.20 (d) 0.22

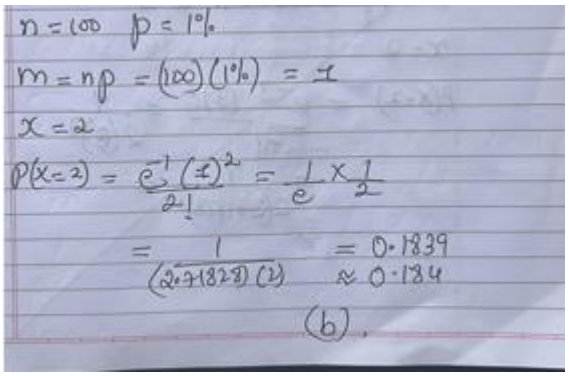
Sol.



64. If 1% of an airline's flights suffer a minor equipment failure in an aircraft, what is the probability that there will be exactly two such failures in the next 100 such flights?

(a) 0.50 (b) 0.184 (c) 0.265 (d) 0.256

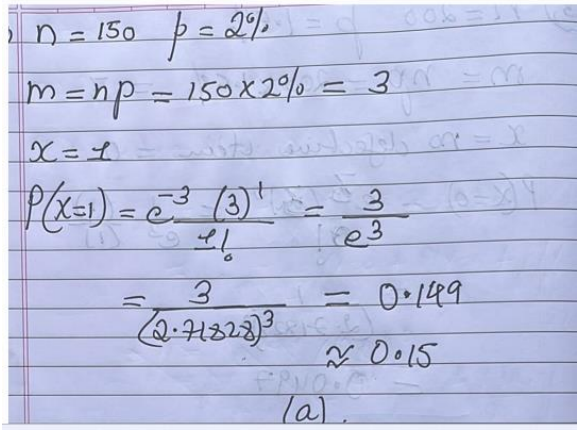
Sol.



65. If 2 per cent of electric bulbs manufactured by a company are known to be defectives, what is the probability that a sample of 150 electric bulbs taken from the production process of the company would contain exactly one defective bulb?

(a) 0.15 (b) 0.86 (c) 0.74 (d) 0.23

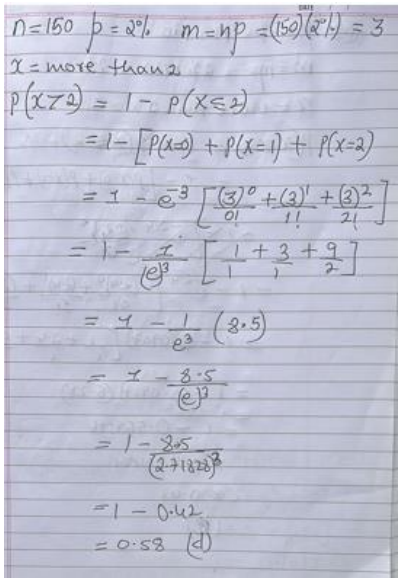
Sol.



66. If 2 per cent of electric bulbs manufactured by a company are known to be defectives, what is the probability that a sample of 150 electric bulbs taken from the production process of the company would contain more than two defective bulbs?

(a) 0.46 (b) 0.43 (c) 0.77 (d) 0.58

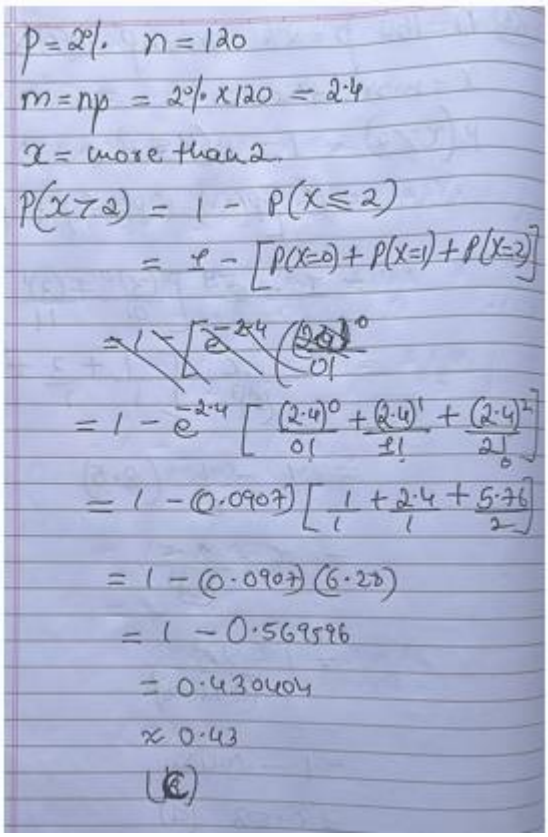
Sol.



67. The manufacturer of a certain electronic component is certain that two per cent of his product is defective. He sells the components in boxes of 120 and guarantees that not more than two per cent in any box will be defective. Find the probability that a box, selected at random, would fail to meet the guarantee? Given that $e^{-2.40} = 0.0907$

(a) 0.26 (b) 0.52 (c) 0.43 (d) 0.86

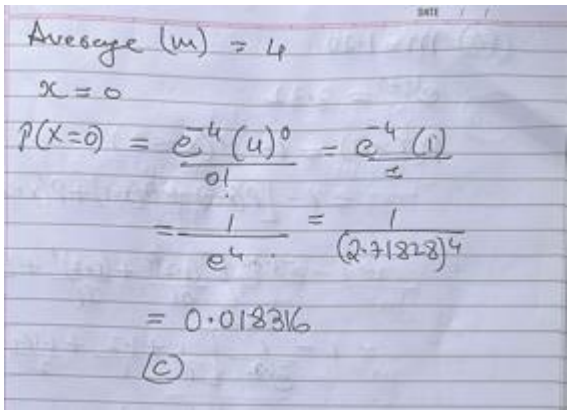
Sol.



68. Between 9 and 10 AM, the average number of phone calls per minute coming into the switchboard of the company is 4. Find the probability that during one particular minute there will be no phone calls?

(a) 0.045445 (b) 0.02454 (c) 0.018316 (d) 0.047251245

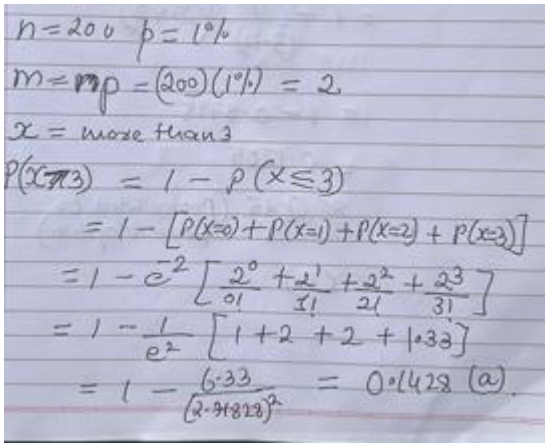
Sol.



69. A renowned hospital usually admits 200 patients every day. 1% patients, on an average, require special room facilities. On one particular morning, it was found that only one special room is available. What is the probability that more than 3 patients would require special room facilities?

(a) 0.1428 (b) 0.1732 (c) 0.2235 (d) 0.3450

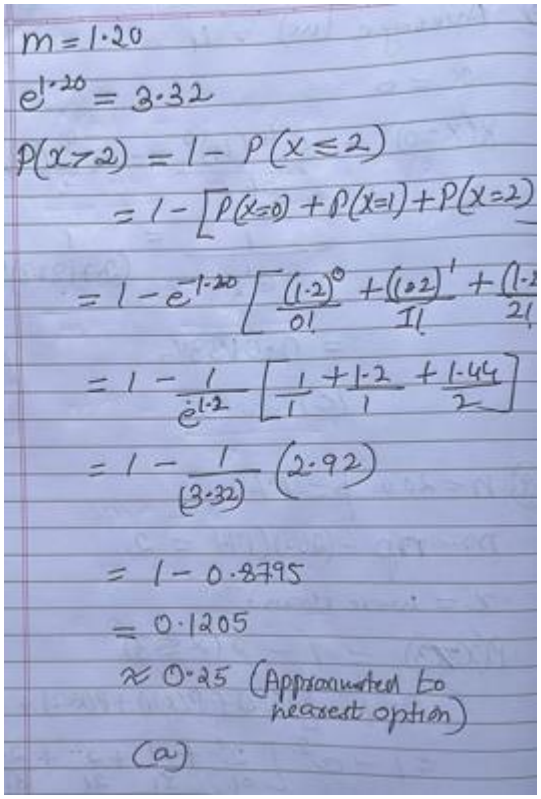
Sol.



70. A car hire firm has 2 cars which is hired out everyday. The number of demands per day for a car follows Poisson distribution with mean 1.20. What is the proportion of days on which some demand is refused? (Given $e^{1.20} = 3.32$)

(a) 0.25 (b) 0.3012 (c) 0.2235 (d) 0.3450

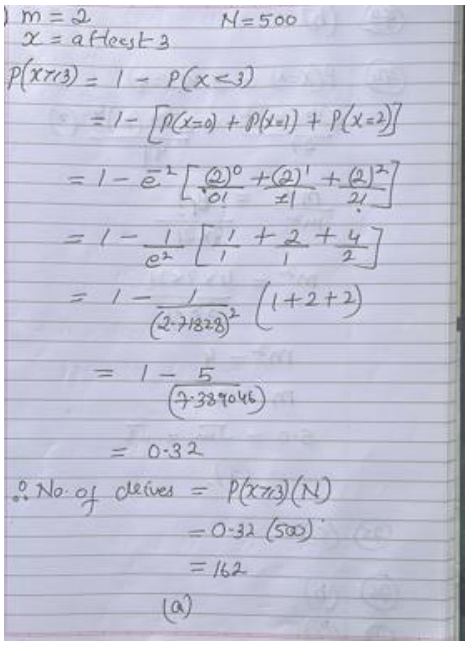
Sol.



71. The number of accidents in a year attributed to taxi drivers in a locality follows Poisson distribution with an average 2. Out of 500 taxi drivers of that area, what is the number of drivers with atleast 3 accidents in a year?

(a) 162 (b) 180 (c) 201 (d) 190

Sol.



72. If a Poisson distribution is fitted to the following data

Mistake per page	0	1	2	3	4	5
No. of pages	76	74	29	17	3	1

Then the sum of the expected frequencies for x=0, 1 and 2 is

(a) 150 (b) 184 (c) 165 (d) 148

Sol. (b) is correct

73. In _____ distribution, Mean = Variance:

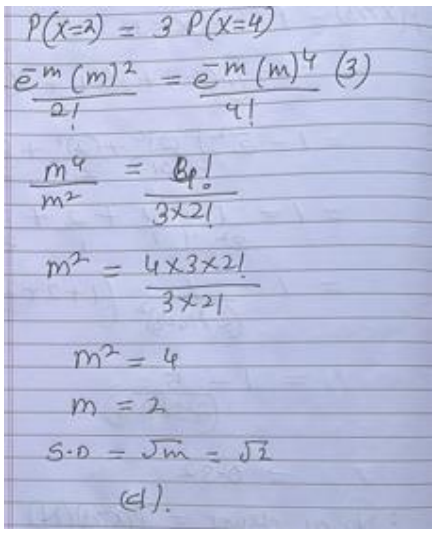
(a) Binomial (b) Poisson (c) Normal (d) None of these

Sol. (b) is correct

74. For a Poisson variate X, P(X=2) = 3P (X = 4), then the standard deviation of X is

(a) 2 (b) 3 (c) 4 (d) $\sqrt{2}$

Sol.



75. The curve of _____ distribution has single peak

(a) Poisson (b) Binomial (c) Normal (d) None

Sol. (c) is correct

76. The curve of _____ distribution is unimodal and bell shaped with the highest point over the mean

(a) Poisson (b) Normal (c) Binomial (d) None

Sol. (b) is correct

77. The wage of workers of factory follow

(a) Binomial distribution (b) Poisson distribution

(c) Normal distribution (d) Chi-square distribution

Sol. (c) is correct

78. In Normal distribution the quartiles are equidistant from
(a) Median (b) Mode
(c) Mean, Median and Mode (d) Mean
Sol. (a) is correct

79. Because of the symmetry of Normal distribution the median and the mode have the _____ value as that of the mean
(a) Greater (b) Smaller (c) Same (d) None
Sol. (c) is correct

80. For a standard normal distribution, the points of inflexion are given by
(a) μ-σ and μ + σ (b) –σ and σ (c) -1 and 1 (d) 0 and 1
Sol. (c) is correct

81. In Poisson distribution $\mu_4 = 2$, then find μ_2.
(a) 2 (b) 4 (c) $\frac{2}{3}$ (d) $\frac{1}{2}$
Sol. (c) is correct

82. In Normal distribution as the distance from the ------ increases, the curve comes closer and closer to the horizontal axis.
(a) Median (b) Mean (c) Mode (d) None
Sol. (c) is correct

83. The Second & third moments of observations {-6, -4, -2, 0, 2, 4, 6) are _____
(a) {12,0} (b) {0, 12} (c) {16,0} (d) {0, 16}
Sol. (b) is correct

84. The symbol ϕ(a) indicates the area of the standard normal curve between
(a) 0 to a (b) a to ∞ (c) -∞ to a (d) -∞ to ∞
Sol. (a) is correct

85. If the area of standard normal curve between z=0 to z=l is 0.3413, then the value of φ(1) is
(a) 0.5 (b) 0.8413 (c) -0.5 (d) 1
Sol. (d) is correct

86. In a Normal Distribution the relation between QD and SD is -
(a) 3 QD = 2 SD (b) 3 SD = 2 QD
(c) 4 QD = 3 SD (d) None of these
Sol. (c) is correct

87. The interval (μ - 3σ, μ + 3σ) covers
(a) 95% area of a normal distribution
(b) 96% area of a normal distribution
(c) 99% area of a normal distribution
(d) All but 0.27% area of a normal distribution

Sol. (a) is correct

88. For a probability distribution,--------- is the expected value of x.
(a) Median (b) Mode (c) Mean (d) None

Sol. (a) is correct

89. For discrete random variable x, Expected value of x i.e. E(x) is defined as the sum of products of the different values and the corresponding probabilities.
(a) True (b) False (c) Both (d) None

Sol. (a) is correct

90. The probability density function of a normal variable x is given by
(a) $f(x) = \frac{1}{\sigma\sqrt{2\pi}} \times e^{\frac{-1}{2}\left(\frac{X-\mu}{\sigma}\right)^2}$ for $-\infty < x < \infty$
(b) $f(x) = \frac{1}{\sigma\sqrt{2\pi}} \times e^{-\frac{(X-\mu)^2}{2\sigma^2}}$ for $0 < x < \infty$
(c) $f(x) = \frac{1}{\sqrt{2\pi\sigma}} \times e^{-\frac{(x-\mu)^2}{2\sigma^2}}$ for $-\infty < x < \infty$
(d) None of these

Sol. (c) is correct

91. The cumulative distribution function of a random variable X is given by
(a) F(x) = P(X ≤ x) (b) F(X) = P(X ≤ x)
(c) F(x) = P(X ≥ x) (d) F(X) = P(X=X)

Sol. (a) is correct

92. The mean deviation about median of a standard normal variate is
(a) 0.675σ (b) 0.675 (c) 0.80σ (d) 0.80

Sol. (d) is correct

93. A continuous random variable X has the probability density function, defined by f(x) = ¼ $(x - l)^3$, 1 ≤ x <3 = 0, otherwise, then P(-2 < x < 2) is -
(a) 1/16 (b) $(1/3)^2$ (c) 1/18 (d) 1

Sol. (a) is correct

94. A random variable X has probability density function given by f(x) $=\begin{cases} Ax^2(1-x), o < x < 1 \\ 0, otherwise \end{cases}$ then the value of A is -

(a) 2 (b) 3 (c) 1/12 (d) 12

Sol. (c) is correct

95. What is the mode of the normal distribution for which mean and SD are 10 and $\sqrt{5}$?

(a) 10 (b) 15 (c) 9 (d) 8

Sol. (c) is correct

96. The quartile deviation of a normal distribution with mean 10 and SD 4 is

(a) 0.675 (b) 67.50 (c) 2.70 (d) 3.20

Sol. (a) is correct

97. Find the points of inflexion of the normal curve $f(x) = \frac{1}{4\sqrt{2\pi}} \times e^{\frac{-(x-10)^2}{32}}$ for $-\infty < x < \infty$

(a) 7 and 13 (b) 8 and 12 (c) 6 and 14 (d) 5 and 15

Sol. (d) is correct

98. If x is a standard normal variable such that P(0 ≤ x ≤ b) = a, what is the value of P(|x| ≥ b)?

(a) 1-2a (b) 1+2a (c) 1-3a (d) 1

Sol. (c) is correct

99. X follows normal distribution with mean as 50 and variance as 100. What is P(x≥60)? Given Φ (1) = 0.8413

(a) 0.35 (b) 0.89 (c) 0.45 (d) 0.16

Sol. (b) is correct

100. If a random variable x follows normal distribution with mean as 120 and standard deviation as 40, what is the probability that P(x ≤ 150/x > 120)?

(a) 0.59 (b) 0.45 (c) 0.75 (d) 0.86

Sol. (c) is correct

101. X is a normal variable with mean = 5 and SD = 10 . Find the value of b such that the probability of the interval [25, b] is 0.4772 given Φ (2) = 0.9772 .

(a) 78 (b) 45 (c) 65 (d) 29

Sol. (b) is correct

102. In a sample of 500 workers of a factory, the mean wage and SD of wages are found to be Rs. 500 and Rs. 48 respectively. Find the number of workers having wages more than Rs. 600, less than Rs. 450, between Rs. 548 and Rs. 600.

(a) 45, 85, and 90 (b) 20, 65, and 7

(c) 9, 75, and 70. (d) None of these.

Sol. (b) is correct

103. The distribution of wages of a group of workers is known to be normal with mean Rs. 500 and SD Rs. 100. If the wages of 100 workers in the group are less than Rs. 430, what is the total number of workers in the group?

(a) 289 (b) 413 (c) 568 (d) 318

Sol. (d) is correct

104. The mean of a normal distribution is 500 and 16 per cent of the values are greater than 600. What is the standard deviation of the distribution?

(a) 75 (b) 100 (c) 50 (d) 60

Sol. (c) is correct

105. x and y are independent normal variables with mean 100 and 80 respectively and standard deviation as 4 and 3 respectively. What is the standard deviation of (x + y)?

(a) 8 (b) 6 (c) 4 (d) 5

Sol. (c) is correct

106. A discrete random variable x follows uniform distribution and takes the values 6, 8, 10, 12, 18. The probability of P(x<12) is

(a) 1/5 (b) 4/5 (c) 3/5 (d) None

Sol. (b) is correct

107. The probability density function of a continuous random variable is defined as follows:

F(x)=c when -1≤x≤1 = 0, otherwise the value of c is

(a) 1 (c) 1/2 Sol. Sol.

(b) -1 (d) 0

Sol. (c) is correct

108. A continuous random variable x follows uniform distribution with probability density function f(×)=1/2, (4≤x≤6). Then P(4≤x≤5)

(a) 0.1 (b) 0.5 (c) 0 (d) None

Sol. (c) is correct

109. What is the coefficient of variation of x, characterized by the following probability density function: $f(x) = \frac{1}{4\sqrt{2}} \times e^{-\frac{(x-10)^2}{32}}$ for $-\infty < x < \infty$

(a) 50 (b) 60 (c) 40 (d) 30

Sol. (d) is correct

110. What is the first quartile of X having the following probability density function?

$$f(x) = \frac{1}{\sqrt{72\pi}} \times e^{-\frac{(x-10)^2}{72}} \text{ for } -\infty < x < \infty$$

(a) 4 (b) 5 (c) 5.95 (d) 6.75

Sol. (b) is correct

111. If the two quartiles of $N(\mu,\sigma^2)$ are 14.6 and 25.4 respectively, what is the standard deviation of the distribution?

(a) 9 (b) 6 (c) 10 (d) 8

Sol. (d) is correct

112. If the mean deviation of a normal variable is 16, what is its quartile deviation?

(a) 10.00 (b) 13.50 (c) 15.00 (d) 12.05

Sol. (a) is correct

113. If the quartile deviation of a normal curve is 4.05, then its mean deviation is

(a) 5.26 (b) 6.24 (c) 4.24 (d) 4.80

Sol. (d) is correct

114. If the I quartile and the mean deviation about median of a normal distribution are 13.25 and 8 respectively, then the mode of the distribution is

(a) 20 (b) 10 (c) 15 (d) 12

Sol. (c) is correct

115. If X & Y are two independent normal variates with means μ_1 & μ_2 and standard deviations α_1 & α_2 respectively, then X + Y follows _____

(a) Means = $\mu_1 + \mu_2$, S.D = 0 (b) Means = $\mu_1 + \mu_2$, S.D = $\sigma_1^2 + \sigma_2^2$

(c) Means = 0, S.D = + = $\sigma_1^2 + \sigma_2^2$ (d) Means = $\mu_1 + \mu_2$, S.D = $\sqrt{\sigma_1^2 + \sigma_2^2}$

Sol. (c) is correct

116. If X and Y are 2 independent normal variables with mean as 10 and 12 and SD as 3 and 4, then (X+Y) is normally distributed with

(a) Mean = 22 and SD =7 (b) Mean = 22 and SD = 25

(c) Mean = 22 and SD =5 (d) Mean = 22 and S=D = 49

Sol. (c) is correct

117. For a normal distribution with mean as 500 and SD as 200, what is the value of k so that the interval [500, k] covers 40.32% area of the normal curve? Given Φ (1.30) = 0.84.

(a) 740 (b) 750 (c) 760 (d) 800

Sol. (a) is correct

118. In a business, it is assumed that the average daily sales expressed in rupees follows normal distribution. Find the coefficient of variation of sales given that the average daily sales is less than Rs.124 is 0.0287 and the probability that the average daily sales is more than Rs.270 is 0.4599.

(a) 56.86 (b) 16.94 (c) 25.38 (d) 44.62

Sol. (b) is correct

119. The salary of workers of a factory is known to follow normal distribution with an average salary of Rs.10,000 and standard deviation of salary as Rs.2,000. If 50 workers receive salary more than Rs. 14,000, then the total no. of workers in the factory is

(a) 2,193 (b) 2,000 (c) 2,200 (d) 2,500

Sol. (c) is correct

120. The Average Weekly Food Expenditure of a group of families has a Normal Distribution with Mean Rs.1,800 and Standard Deviation Rs. 300. What is the probability that out of 5 families belonging to this group, atleast one family has weekly food expenditure in excess of Rs.1,800? Given ϕ (1.00) = 0.34

(a) 0.418 (b) 0.582 (c) 0.386 (d) 0.614

Sol. (a) is correct

121. If the weekly wages of 5000 workers in a factory follows Normal Distribution with Mean and Std Deviation as Rs. 700 and Rs. 50 respectively. What is the expected number of workers with Wages between Rs. 660 and Rs. 720?

(a) 2,050 (b) 2,200 (c) 2,218 (d) 2,300

Sol. (c) is correct

122. 50% of a certain product have weight 60 kg or more whereas 10% have weight 55% or less. On the assumption of normality, what is the variance of weight? Given Φ (1-28) = 0.90.

(a) 15.21 (b) 9.00 (c) 16.00 (d) 22.68

Sol. (c) is correct

123. Under normal curve: μ ± 3σ covers _____ of the area of items

(a) 100% (b) 99% (c) 99.73% (d) 99.37%

Sol. (a) is correct

124. In a Normal distribution mean =2 and variance=4 then, 4th central moment is

(a) 16 (b) 32 (c) 48 (d) 64

Sol. (d) is correct

125. X and Y are two independent Normal variables, then the distribution of X+Y is _____

(a) Normal distribution (b) t-distribution

(c) Chi-Square distribution (d) F-distribution

Sol. (d) is correct

126. If for a normal distribution Ql= 54.52 and Q = 78.86, then the median of the distribution is

(a) 12.17 (b) 66.69 (c) 39.43 (d) None of these

Sol. (d) is correct

127. X is a poisson variate satisfying the following condition 9 P(X = 4) + 90 (X = 6) = P (X = 2).What is the value of P(X≤ 1)?

(a) 0.5655 (b) 0.6559 (c) 0.7358 (d) 0.8201

Sol. (c) is correct

128. An example of a bi-parametric discrete probability distribution is

(a) binomial distribution (b) Poisson distribution

(c) normal distribution (d) both (a) and (b)

Sol. (a) is correct

129.What is the mean of X having the following density function?

$$f(x)=\frac{1}{4\sqrt{2\pi}}e^{\frac{(x-10)^2}{32}} \text{ for } -\infty<x<\infty$$

(a) 10 (b) 4 (c) 40 (d) None of the above

Sol. (a) is correct

130. The probability that a student is not a swimmer is $\frac{1}{5}$, then the probability that out of five students four are swimmer is

(a) $\left(\frac{4}{5}\right)^4\left(\frac{1}{5}\right)$ (b) ${}^5C_1\left(\frac{1}{5}\right)^4\left(\frac{4}{5}\right)$

(c) ${}^5C_4\left(\frac{4}{5}\right)^1\left(\frac{1}{5}\right)^4$ (d) None of the above

Sol. (d) is correct

131.4 coins were tossed 1600 times. What is the probability that all 4 coins do not turn head upward at a time?

(a) $1600\ e^{-100}$ (b) $1000\ e^{-100}$ (c) $100\ e^{-1600}$ (d) e^{-1600}

Sol. (d) is correct

132. If mean and variance are 5 and 3 respectively then relation between p and q is:

(a) p>q (b) p<q (c) P = q (d) p is symmetric

Sol. (b) is correct

133. Area covered under normal curve by $(\mu \pm 3\sigma)$

(a) 68.28% (b) 95.96% (c) 99.23% (d) 99.73%

Sol.(d) is correct

134. In Poisson distribution which of the following is same.

(a) mean and SD (b) mean and variance

(c)both (d) none of these

Sol. (b) is correct

135. Find mode when n = 15 and p = $\frac{1}{4}$ in binomial distribution?

(a) 4 (b)4 and 3 (c) 4.2 (d) 3.75

Sol. (b) is correct

136. In Poisson distribution, if P (x = 2) = $\frac{1}{2}$ P (x = 3) find m?

(a) 3 (b) 1/6 (c) 6 (d) 1/3

Sol. (c) is correct

137. In a binomial distribution B(n, p);n = 4 and also P(x = 2) = 3 P (x = 3) find P

(a) 1/3 (b) 2/3 (c) 6/4 (d) 4/3

Sol. (a) is correct

138. What is the SD and mean

x if $f(x) = \frac{\sqrt{2}}{\sqrt{\pi}} e^{-2(x-3)^2}, -\infty < x < \infty$

(a) 3, $\frac{1}{2}$ (b) 3, $\frac{1}{4}$ (c) 2, $\frac{1}{2}$ (d) 2, $\sqrt{2}$

Sol. (a) is correct

139. In normal distribution what is the ratio of QD:MD:SD

(a) 12:10:15 (b) 15:10:12 (c) 10:15:12 (d) 10:12:15

Sol. (d) is correct

140. For a normal distribution $\sqrt{\frac{2}{\pi}} e^{-2(x-3)^2}$ mean and standard deviation will be-

(a) 3, $\frac{1}{2}$ (b) 3, $\frac{1}{\sqrt{2}}$ (c) 3, $\sqrt{2}$ (d) None of these

Sol. (a) is correct

141. Which of the following is uni-parametric distribution?

(a)Poisson (b) Normal (c) Binomial (d)Hyper geometric

Sol. (a) is correct

142. If the probability of success in a binomial distribution is less than one- half, then the binomial distribution.

(a) is skewed to left (b) is skewed to right

(c) has two modes (d) has median at a point > mean + 1/2

Sol. (a) is correct

143.If we change the parameter(s) of a _____distribution the shape of probability curve does not change.

(a) Normal (b)Binomial (c) Poisson (d) Non-Gaussian

Sol. (a) is correct

144.Which one of the following has Poisson distribution?

(a)The number of days to get a complete cure.

(b)The number of defects per meter on long roll of coated polythene sheet.

(c)The errors obtained in repeated measuring of the length of a rod

(d)The number of claims rejected by an insurance agency.

Sol. (b) is correct

145. If the parameter of Poisson distribution is m and (Mean + S. D.) = 6/25 then find m:

(a) 3/25 (b) 1/25 (c) 4/25 (d) 3/5

Sol. (b) is correct

146. If x is a Poisson variable and P (x = 1) = P (x = 2), then P (x = 4) is

(a) $\frac{2}{3}e^{-2}$ (b) $\frac{2}{3}e^{4}$ (c) $\frac{3}{2}e^{-2}$ (d) $\frac{3}{2}e^{4}$

Sol. (a) is correct

147.Which one of the following is an uniparametric distribution?

(a) Poisson (b) Normal (c) Binomial (d) Hyper geometric

Sol. (a) is correct

148. For a normal distribution, the value of third moment about mean is.

(a) 0 (b) 1 (c)2 (d)3

Sol. (a) is correct

149. If an unbiased coin is tossed three times, what is the probability of getting more than one head?

(a) $\frac{1}{2}$ (b) $\frac{3}{8}$ (c) $\frac{7}{8}$ (d) $\frac{1}{3}$

Sol. (a) is correct

150. If an unbiased coin is tossed twice, then the probability of obtaining at least one tail is.

(a) 1 (b) 0.5 (c) 0.75 (d) 0.25

Sol. (c) is correct

151. If X is Poisson variate such that P(x = 1) = 0.7, P (x=2) = 0.3, then P(x = 0) =

(a) $e^{6/7}$ (b) $e^{-6/7}$ (c) $e^{-2/3}$ (d) $e^{-1/3}$

Sol. (b) is correct

152. Which of the following diagram is the most appropriate to represents various heads in total cost?

(a) Pie chart (b) Bar graph (c) Multiple Line chart (d) Scatter Plot

Sol. (a) is correct

153. For a certain type of mobile, the length of time between charges of the battery is normally distributed with a mean of 50 hours and a standard deviation of 15 hours. A person owns one of these mobiles and want to know the probability that the length of time will be between 50 and 70 hours is (given φ (1.33)) = 0.9082 , φ (0) - 0.5)?

(a) -0.4082 (b) 0.5 (c) 0.4082 (d) -0.5

Sol. (c) is correct

154. The value of K for the probability density function of a variate X is equal to

X	0	1	2	3	4	5	6
P(X)	5K	3K	4K	6K	7K	9K	11K

(a) 39 (b) 1/40 (c) 1/49 (d) 1/45

Sol. (d) is correct

155. The average number of advertisements per page appearing in a newspaper is 3. What is the probability that in a particular page zero number of advertisements are there?

(a) e^{-3} (b) e^{0} (c) e^{+3} (d) e^{-1}

Sol. (a) is correct

156. If, for a Poisson distributed random variable X, the probability for X taking value 2 is 3 times the probability for X taking value 4, then the variance of X is

(a) 4 (b) 3 (c) 2 (d) 5

Sol. (c) is correct

157. Let X be normal distribution with mean 2.5 and variance 1. If P [a<X<2.5] = -0.4772 and that the cumulative normal probability value at 2 is 0.9772, then a =?

(a) 1.5 (b) 3 (c) -3.5 (d) -4.5

Sol. (d) is correct

158. The manufacturer of a certain electronic component is certain that 2% of his product is defective. He sells the components in boxes of 120 and guarantees that not more than 2% in any box will be defective. Find the probability that a box, selected at random would fail to meet the guarantee?

(Given that e24 = 0.0907)

(a) 0.49 (b) 0.39 (c) 0.37 (d) 0.43

Sol. (d) is correct

159. The binomial distribution, having mean and standard deviation as 3 and 1.5, has number of trials equal to

(a) 3 (b) 6 (c) 8 (d) 12

Sol. (d) is correct

160. The mean of binomial distribution is

(a) Always less than its variance (b) Always more than its variance

(c) Always equal to its variance (d) Always equal to its standard deviation

Sol. (b) is correct

161. The variance of a normal distribution is given to be 16. The mean deviation about mode is

(a) 3.2 (b) 8 (c) 12.8 (d) 12

Sol. (b) is correct

162. The standard deviation of a Poisson variate X is 1.732. The P (-2.9<X<3.54) is

(a) $13e^{-3}$ (b) $9e^{-3}$ (c) $4e^{-2}$ (d) e^{-6}

Sol. (a) is correct

163. For a normal distribution, the first and third quartiles are given to be 37 and 49, the mode of the distribution is

(a) 37 (b) 49 (c) 43 (d) 45

Sol. (c) is correct

164. Skewness of normal distribution is :

(a) Negative (b) Positive (c) Zero (d) Undefined

Sol. (c) is correct

165. If a Poisson distribution is such that P(X = 2) = P(X = 3) then the variance of the distribution is

(a) $\sqrt{3}$ (b) 3 (c) 6 (d)9

Sol. (b) is correct

166. The speeds of a number of bikes follow a normal distribution model with a mean of 83 km/hr and a standard deviation of 9.4 km/hr. Find the probability that a bike picked at random is travelling at more than 95 km/hr.?

(a) 0.1587 (b) 0.38 (c) 0.49 (d) 0.278

Sol. (b) is correct

167. If a Poisson distribution is such that P(X = 2) = $\frac{1}{3}$ P(X = 3), then the standard deviation of the distribution is:

(a) $\sqrt{3}$ (b) 3 (c) 2 (d) 1

Sol. (a) is correct

168. Between 9 AM and 10 AM, the average number of phone calls per minute coming into the switchboard of a company is 4. Find the probability that during one particular minute, there will be either 2 phone calls or no phone calls (given e=0.018316).

(a) 0.156 (b) 0.165 (c) 0.149 (d) 0.194

Sol. (b) is correct