OPEN STUDENT FOUNDATION

Date : 02-03-2024 **STD 12 Commerce Statistics** **Total Marks : 44**

CH 3 PART 2

* **Answer The Following Questions In One Sentence.** **[12]**

1. Define standard normal variable and write its probability density function.
2. What is the shape of standard normal curve? To which value of variable it is symmetric ?
3. If X Is a normal variable with mean 100 and standard deviation 15, then find the percentage of observations (i) Having value more than 85. (ii) Having value less than 130.
4. The weight of randomly selected 500 adult persons from a region of a city follows normal distribution. The average weight of these persons is 55 kg and Its standard deviation is 7 kg.
   (i) Estimate the number of persons having weight between 41kg to 62 kg.
   (ii) Estimate the number of persons having weight less than 41 kg.
5. The monthly bill amount of regular customers of a provision store follows normal distribution. If 7.78 % customers have monthly bill amount less than Rs 3590 and 94.52 % customers have bill amount less than Rs 5100, then determine the parameters of the normal distribution. Also determine the interval for monthly bill amount of exactly middle 95 % customers.
6. An Intelligence test is conducted for 500 children and it is found that the average marks are 68 and standard deviations is 22. If the marks obtained by the children is normally distributed, then (1) Find the number of children getting marks more than 68. (2) Find the percentage of children getting marks between 70 and 90. (3) Find the minimum score of most intelligent 50 children.
7. A normal variable X has following probability density function: $$ f(x)=\text { constant } \cdot e^{-\frac{1}{200}(x-50)^2},-\infty 0
8. A normal variable X has mean 400 and variance 900. Find the fourth decile and 90^{th} percentile for this distribution and also interpret the values.
9. A normal distribution has mean 52 and variance 64. Obtain estimated limits which include exactly middle 25% of the observations.
10. The average weight of 500 persons of age between 20 years and 26 years of certain are is 55 kg and its variance is 100 $(kg)^2$. The weight of these persons follows normal distribution. According to the weight of persons they can be categorized as under:
    (1) Persons having weight more than 70 kg is in the fat persons group.
    (2) Persons having weight between 50kg to 60kg is in the healthy persons group.
    (3) Persons having weight less than 35 kg is in the physically weak persons group.

From this information, estimate the number of fat persons, number of healthy persons and number of physically weak persons in that area.

11. An Amount of purchase of a customer in a mall of a city follows normal distribution with mean Rs. 800 and standard deviation Rs. 200. If customers are selected at random then find the probabilities for the following events:
(1) Amount of purchase made by him in between Rs. 850 to Rs. 1200.
(2) Amount of purchase made by him in between Rs. 600 to Rs. 750.

12. A normal variable X has the following density function.

$$F(x) = \frac{1}{50\sqrt{2\pi}} \cdot e^{-\frac{1}{2}\left(\frac{x-150}{50}\right)^2} \; ; -\infty < x < \infty$$

For this distribution,
(i) If $P(x_1 < X < 250) = 0.4772$ then estimate x_1
(ii) If $P(75 < X < x_2) = 0.3539$ then estimate x_2.

*** Answer The Following Questions as Directed.**

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13. The number of students in classes of higher secondary schools of a city follows normal distribution. Average number of students in the classes is 50 and standard deviation is 15. If a class is selected at random then find the following probabilities (i) a class consists of more than 68 students (ii) a class consists of less than 32 students.

14. The average weight of grown up children living in a large society is 50 kg and its standard deviation is 5 kg. If their weight follows normal distribution and a grown up child is selected at random then find (1) the probability that his weight is between 55 kg and 65 kg. (2) the probability that his weight is between 35 kg and 45 kg.

15. The monthly income of workers working in a production house follows normal distribution. Their average monthly income is ₹ 15,000 and standard deviation is 4000. (1) If a worker is selected at random then find the probability that his monthly income is between ₹ 10,000 and ₹ 25,000. (2) Find the percentage of workers having monthly income between ₹ 12,000 and ₹ 22,000 in the production house.

*** Calculate The Following Sums In Detail.** **[20]**

16. In a city, daily sale of petrol at a petrol pump follows normal distribution and its mean and standard deviation are 33,000 litre and 3000 litre respectively. (1) Obtain the percentage of days of a month during which the daily sales of petrol is less than 30,000 litre. (2) During the month of May, how many days are expected so that the sale of petrol is between 32,000 litre to 35,000 litre?

17. 200 students are selected from all the students of a school and the marks obtained by them in an examination of 100 marks follows normal distribution. The mean marks of the distribution is 60 and its standard deviation is 8.
(1) If 70 or more marks are required for the special scholarship then obtain the number of students getting special scholarship.

(2) **Obtain the minimum marks of 10% of the students getting maximum marks. Here, X = marks obtained by a student**

18. The monthly income of a group of employees follows normal distribution. The mean of the distribution is ₹ 15,000 and its standard deviation is ₹ 4000 . From this information, (1) obtain range of monthly income for middle 60% of the employees. (2) if monthly income of 250 employees is between 15000 apd certain fixed income x_1 then find the value of x_1.

19. For a group of 1000 persons, the average height is 165cms and variance is $100(\text{cms})^2$. The distribution of height of these persons follows normal distribution. From this information, determine the third decile and the 60th percentile and interpret it.

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