Topics: Normal distribution, Functions of Random Variables

1. The time required for servicing transmissions is normally distributed with *μ* = 45 minutes and *σ* = 8 minutes. The service manager plans to have work begin on the transmission of a customer’s car 10 minutes after the car is dropped off and the customer is told that the car will be ready within 1 hour from drop-off. What is the probability that the service manager cannot meet his commitment?
2. 0.3875
3. 0.2676
4. 0.5
5. 0.6987

Answer: B

1. The current age (in years) of 400 clerical employees at an insurance claims processing center is normally distributed with mean *μ* = 38 and Standard deviation *σ* =6. For each statement below, please specify True/False. If false, briefly explain why.
2. More employees at the processing center are older than 44 than between 38 and 44.

Answer: False: As value calculated shows that employees between 38 and 44 of age is more*.*

1. A training program for employees under the age of 30 at the center would be expected to attract about 36 employees.

Answer: True

1. If *X1* ~ *N*(μ, σ2) and *X*2 ~ *N*(μ, σ2) are *iid* normal random variables, then what is the difference between 2 *X*1 and *X*1 + *X*2? Discuss both their distributions and parameters.

Answer: The mean of 2X1 and X1+X2 is same but the variance of 2X1 is 2 times more than the variance of X1+X2 the distribution remains the same for every sample of similar source and fall under Normal distribution with slight deviations in parameters.

1. Let X ~ N(100, 202). Find two values, *a* and *b*, symmetric about the mean, such that the probability of the random variable taking a value between them is 0.99.
2. 90.5, 105.9
3. 80.2, 119.8
4. 22, 78
5. 48.5, 151.5
6. 90.1, 109.9

Answer: D

1. Consider a company that has two different divisions. The annual profits from the two divisions are independent and have distributions Profit1 ~ N(5, 32) and Profit2 ~ N(7, 42) respectively. Both the profits are in $ Million. Answer the following questions about the total profit of the company in Rupees. Assume that $1 = Rs. 45
2. Specify a Rupee range (centered on the mean) such that it contains 95% probability for the annual profit of the company.

Answer: :The range in rupees at 95% probability is 99.008 -980.99 crore

1. Specify the 5th percentile of profit (in Rupees) for the company

Answer: The fifth percentile of profit is Rs 170 cror

1. Which of the two divisions has a larger probability of making a loss in a given year?

Answer: Division1 has slightly probability of making loss compared to division2 in the given year but if we don’t look at depth none of the division have possible loss in the given year.