**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

A:-

**(B)**

1. The current age (in years) of 400 clerical employees at an insurance claims processing center
2. below, please specify True/False. If false, briefly explain why.
3. More employees at the processing center are older than 44 than between 38 and 44.
4. A training program for employees under the age of 30 at the center would be expected to attract about 36 employees.

A :

1. True

There are more employees at the processing center are older than 44 than between 38 and 44

1. 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.

A :

If *X1*~ *N*(μ, σ2) and *X*2 ~ *N*(μ, σ2) are *iid* normal random variables

X1+x2 =N (μ1+μ2, σ12+ σ22)

2x1 = N(2μ + 2 σ22)

2x1-X1+X2 = n(4μ,6 σ22)

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

A:

**(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.
3. Specify the 5th percentile of profit (in Rupees) for the company
4. Which of the two divisions has a larger probability of making a loss in a given year?

A:

1. **Range is Rs (99.00810347848784, 980.9918965215122) in millions**
2. **5th percentile of profit is Rs 170.0 millons.**
3. **Probability of Division 1 making a loss in a given year is more than Division 2.**