**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 = TRUE

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 normal random variables, then what is the difference between 2 *X*1 and *X*1 + *X*2? Discuss both their distributions and parameters.

ANSWER: if we multiply x1 with 2 the mean will also be multiplied by 2 and variance will be the 2\*\*2 \*variance.

2X1 = N(2\* μ , (2\*\*2 )σ2  )

If we add any number to X1 or X2 the value only be added to the mean without adding anything to the variance.so, variance will not be affected.variance will be same.

(X1+X2) = N (μ+X2 , σ2  )

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 : option D is correct

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 : mean of both divisions = 5+7 = 12M

Standard deviation of profits of both divisions = 32  + 42 =9+16 = sqrt 25= 5\*45 = 225M

Rupee range (centered on the mean) such that it contains 95% probability for the annual profit of the company is

(99.00810347848784, 980.9918965215122)

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

ANSWER: 169.875 in millions

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

ANSWER : division 1 has a larger probability of making a loss in a given year.