**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

**Ans**:



Ans: B (0.2676)

By using Z score value is (50-45)/8=0.625 and 1-stats.norm.cdf (0.625)

2.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.

1. More employees at the processing center are older than 44 than between 38 and 44.

Ans: False, because people between 38-44 and more than 44 at age group are 137 and 63 out of 400 respectively.

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

**Ans**: True.



3) If X 1 ~ N (μ, σ 2) and X 2 ~ N (μ, σ 2) 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.

**Ans**: Normal distribution. Parameters are same.

4) Let X ~ N (100, 20 2). 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.

1. 90.5, 105.9
2. 80.2, 119.8
3. 22, 78
4. 48.5, 151.5
5. 90.1, 109.9

**Ans**: D- 48.5, 151.5



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.

**Ans**: Range:99.008-980.992

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

**Ans**: 170 million

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

**Ans**: Profit2

