**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: The probability that the service manager cannot meet his commitment is 0.26598.**

* **Refer “A2-Set2.ipynb file”**

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.

**ANS: FALSE**

**Because P(X>44) =15.87% is less than P(38<X<44) =34.13%**

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

**ANS: TRUE**

**Because P(X<30) =0.09 ; 400x0.09=36**

* **Refer “A2-Set2.ipynb file”**

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.

**ANS: The 2*X*1 and *X*1 + *X*2 are same if, they are independently identically distributed and the**

**Data is large.**

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

**ANS: 48.5 , 151.5**

* **Refer “A2-Set2.ipynb file”**

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: The Range is Rs (99.0081, 980.9918) in millions**

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

**ANS: The 5th Percentile of profit (in million Rs) is 170.0**

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

**ANS: The Division one making a larger probability of loss that is 0.0477.**

* **Refer “A2-Set2.ipynb file”**

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