**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:- 1-stats.norm.cdf(60,loc=55,scale=8) = 0.2659 , (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.

**Ans:- stats.norm.cdf(44,loc=38,scale=6) = 0.8413=84.13%**

**Ppl above 44 age = 100-84.13 = 12.87=63 out of400**

**Z = (38-38)/6=0=50% = betn age 38 & 44 = 84.3-50 = 3.13% = 137 out of 400**

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

**Is FALSE**

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

**Ans:- Z = (30-38)/6 = -1.33 = 9.15 = 36 out of 400 is TRUE**

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

**Im not understand question**

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:- mean = 100 , SD = 20, p(a , x ,b )=0.99**

**Hence, we want to find the 0.5th and the 99.5th percentiles Z score values**

**Z(0.5) = stats.norm.ppf(0.005) = -2.5758**

**Z(99.5) = stats.norm.ppf(0.995) = 2.575**

**Z = (x-100)/20**

**A = 48.5**

**B = 152.8**

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?

**Ans :- Plz refer attached file to mail.**