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: B:0.26**

**Refer to(Assignment 2 yugal Fegade.ipynb)**

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

**Solution:**

**Mean=38**

**SD=6**

**Z score=(Value – Mean)/SD**

**Z score for 44 = (44 – 38)/6 = 1 => 84.13 %**

**People above 44 age =100 – 84.13 = 15.87% ≈ 137 out of 400**

**Z score for 38 = (38 – 38)/6 = 0 =>50%**

**Hence People between 38 & 44 age = 84.13 – 50 = 34.13% ≈ 137 out of 400**

**Hence More employees at the processing Centre are older than 44 than between 38 and 44. Is FALSE**

**Z score for 30 = (30 – 38)/6 = -1.33 = 9.15 % ≈ 36 out of 400**

**Hence A training program for empolyees under the age of 30 at the centre would be expected to attract about 36 empolyees - 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.

**Ans:**

**2X1~N(2 µ, σ2)**

**X1 + X2 ~ N( µ+µ, σ2,+σ2)~N(2 µ, 2 σ2)**

**For both distribution location parameter is same only scale parameter is**

**different.**

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: D:48.5,151.5**

**refer to(Assignment 2 yugal Fegade.ipynb)**

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 is Rs (99.00810347848784, 980.9918965215122) in Millions**

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

**Ans: 5th percentile of profit is 170.0**

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

**Ans: division 2nd**

**Ans: refer to(Assignment 2 yugal Fegade.ipynb)**