**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
6. B is the answer. The probability that the service manager cannot meet his commitment is 0.265985
7. 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.
8. More employees at the processing center are older than 44 than between 38 and 44.
9. The above statement is False. Because the number of employees older than 44 (i.e., 63 employees approx..) is less than the number of employees between 38 and 44 (i.e., 137 employees approx..).
10. A training program for employees under the age of 30 at the center would be expected to attract about 36 employees.
11. The given statement is True.
12. 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.
13. Given that and are iid normal random variables.

According to the properties of normal random variables,



Now, the difference between and is

Hence, the difference between them says that the two given variables are identically and independently distributed.

In case of parameters, the mean of and is same. The variance of is twice the variance of .

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
7. D is the answer. From the given information, the values of a and b are 48.4834 and 151.5165
8. 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
9. Specify a Rupee range (centered on the mean) such that it contains 95% probability for the annual profit of the company.
10. The range of the Rupee lies between Rs. 99.008 and Rs. 980.99 in Millions.
11. Specify the 5th percentile of profit (in Rupees) for the company
12. The 5th percentile of profit in Rupees for the company is

169.90793393591858 170.0 in Millions.

1. Which of the two divisions has a larger probability of making a loss in a given year?
2. The probability of First division to make loss is 0.0477

The probability of Second division to make loss is 0.0400

Hence, the first division of company has a larger probability of making loss in a given year.