Topics: Normal distribution, Functions of Random Variables

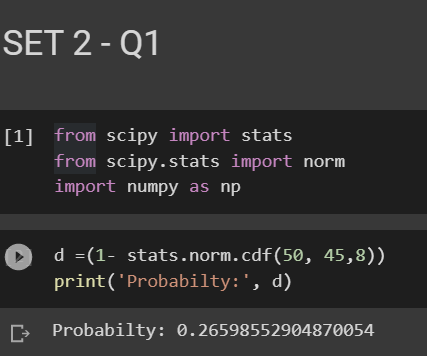
1. The time required for servicing transmissions is normally distributed with  = 45 minutes and  = 8 minutes. The service manager plans to have work begin on the transmission of a customer’s car 10 minutes after the car is dropped off and the customer is told that the car will be ready within 1 hour from drop-off. What is the probability that the service manager cannot meet his commitment?

A. 0.3875

B. 0.2676

C. 0.5

D. 0.6987

ANS: B

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1. The current age (in years) of 400 clerical employees at an insurance claims processing center is normally distributed with mean  = 38 and Standard deviation  =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: 15.86%



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

ANS: TRUE

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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: If X1 and X2 are normally distributed then the sum of the random sample will be exactly same.

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.

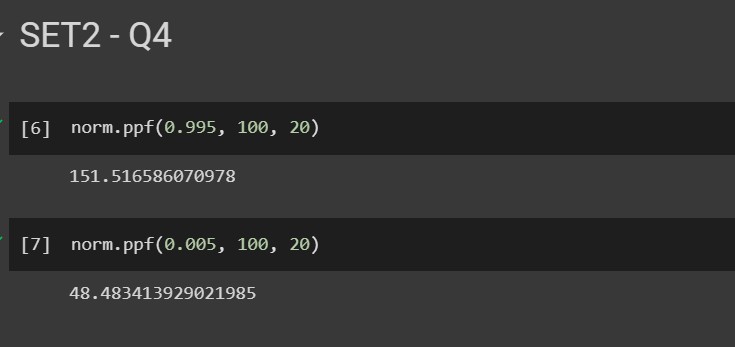
A. 90.5, 105.9

B. 80.2, 119.8

C. 22, 78

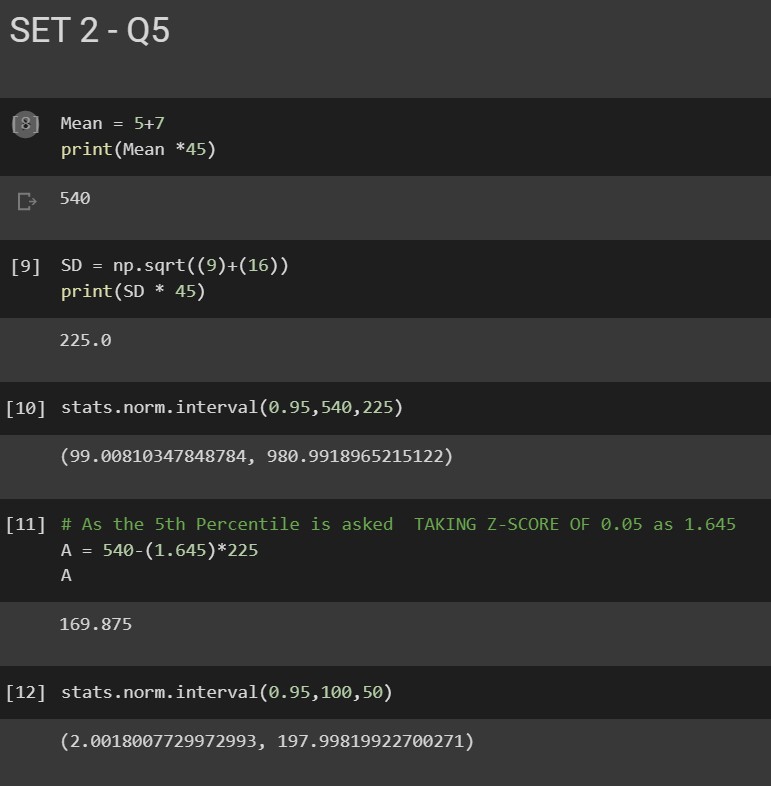
D. 48.5, 151.5

E. 90.1, 109.9

ANS: D

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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
   1. Specify a Rupee range (centered on the mean) such that it contains 95% probability for the annual profit of the company.
   2. Specify the 5th percentile of profit (in Rupees) for the company
   3. Which of the two divisions has a larger probability of making a loss in a given year?

ANS: