Department of Computer Science, University of Karachi
BSCS: 306: Probability and Statistical Methods
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Assignment: 04: Normal Distribution

Q 1. Given a normal distribution with μ = 120 and σ = 18, find
a) The area below 96.
b) The area above 81.
c) The area between 126 and 153.
d) The point that has 45% of the area below it.
e) The point that has 13% of the area above it.

Q 2. Given a normal distribution with μ =100 and σ =5 find
a) The area below 107
b) The area above 89.5
c) The area between 94 and 103.
d) The point that has 80% of the area below it.
e) The two points containing the middle 75% of the area.

Q 3. Given normal random variable X, $X \sim N(\mu, \sigma^2)$ with μ =18 and σ =2.5. Find
a) $P(X < 15)$
b) $P(16 \le X \le 20)$
c) The value of k such that $P(X > k) = 0.1539$

Q 4. *If X is a standard normal variable. Find c such that $P(X \le C) = 0.1151$.*

Q 5. *IF X is normally distributed and $P(X > 7) = 0.05, P(X < 5) = 0.5$. Calculate $P(4 < X < 6)$.*

Q 6. If X is a normal variable with mean= 3 and variance = 9. Find
a) $P(2 < X < 5)$
b) $P(X > 0)$
c) $P(|X - 3| > 6)$

Q 7. Given the normally distributed variable X with mean 36 and standard deviation 5, find.
a) P(X < 30)
b) The value of k such that P(X < k) = 0.2578.
c) P(34 < X < 42)
d) The value of k such that P(X > k) =0.1539.

Q 8. An engineer commutes daily from his home to his office. On the average the trip of one way takes 24 minutes with a standard deviation of 3.8 minutes. Assume the distribution of trip times to be normally distributed.
a) What is the probability that a trip will take at least $\frac{1}{2} hour$.

b) If the office opens at 9.00 A.M. and he leaves his house at 8:45 A.M daily, what percentage of the time is he late from work?
c) If he leaves the house at 8:35 A.M. and tea is served at the office from 8:50 AM until 9:00 AM. What is the probability that he misses the tea?
d) Find the length f time above which we find the slowest 15% of the trip.

Q 9. Entry to a certain University is determined by a national test. The scores on this test are normally distributed with a mean of 500 and a standard deviation of 100. Tom wants to be admitted to this university and he knows that he must score better than at least 70% of the students who took the test. Tom takes the test and scores 585. Will he be admitted to this university?

Q 10. The length of similar components produced by a company are approximated by a normal distribution model with a mean of 5 cm and a standard deviation of 0.02 cm. If a component is chosen at random:
a) what is the probability that the length of this component is between 4.98 and 5.02 cm?
b) What is the probability that the length of this component is between 4.96 and 5.04 cm.

Q 11. For a certain type of computers, the length of time between charges of the battery is normally distributed with a mean of 50 hours and a standard deviation of 15 hours. John owns one of these computers and wants to know the probability that the length of time will be between 50 and 70 hours.

Q 12. If X is normally distributed with μ = 12 and σ = 2. Find the following probabilities if Y= 4X + 2.
a) $P(Y \leq 48)$
b) $P(Y \geq 60)$
c) $P(46 \leq Y \leq 58)$.

Q 13. A commercial music songwriter is paid commissions according to how many times the commercial they scored is aired on network television. Assume that the number of times the commercial using their music will air is normally distributed with a mean of 1200 and standard deviation of 300.
a) Compute the probability that the commercial airs at most 1200 times.
b) Compute the probability that the commercial airs between 1200 and 1500 times.
c) Compute the probability that the commercial airs more than 1500 times.
d) Compute the probability that the commercial airs between 1000 and 1500 times