

Math 011: Lab Assignment #8 – Applications of the Normal Distribution

Instructions: You are encouraged to work together on these problems. Perform the following tasks and present your work *neatly* and *clearly*. I want you to turn in your completed results, presented in a clear professional manner. *Answer all questions in complete sentences* when a written answer is required.

The ABC Manufacturing Corporation produces steel rods. Due to manufacturing defects, there is some small variation in the lengths of the rods. The lengths of the rods have a Normal distribution with mean $\mu = 25$ cm. and standard deviation $\sigma = 0.07$ cm. Suppose one steel rod is randomly selected from a batch and measured.



For each problem #1 – 3, show any relevant z-score calculation, draw a normal curve, label the mean of the distribution, and shade in the region that illustrates the area representing the given probability.

1. Find the probability that a randomly-selected steel rod has a length *less than* 24.90 cm. (3 pts)
2. Find the probability that a randomly-selected steel rod has a length *greater than* 25.03 cm. (3 pts)
3. The quality control division of the ABC Manufacturing Corporation considers rods with lengths between 24.8 cm and 25.2 cm to have an acceptable amount of error. Any rod with a length outside this range is considered defective. Find the probability that a randomly-selected steel rod is *considered acceptable* (i.e. *not considered defective*). (4 pts)

(continued on the back)

4. Find the z-score that separates the lowest 9% of values from the highest 91% of values in the standard normal distribution. Draw a normal curve, shade in the region that illustrates the lowest 9% of values, then label your answer to the problem on your sketch as a z-score. (3 pts)
5. Find the 9th percentile, P_{90} , for the lengths of steel rods; that is, what length separates the shortest 9% of rods from the longest 91% of rods (show your calculation)? (2 pts)
(Hint: apply your answer from #4).
6. Find the z-score that separates the lowest 80% of values from the highest 20% of values in the standard normal distribution. Draw a normal curve, shade in the region that illustrates the lowest 9% of values, then label your answer to the problem on your sketch as a z-score. (3 pts)
7. Find the 80th percentile, P_{80} , for the lengths of steel rods; that is, what length separates the shortest 80% of rods from the longest 20% of rods (show your calculation)? (2 pts)
(Hint: apply your answer from #6).