Webquest Assignment

Read and summarize the info found at this site in your notes. Ignore the formula.

http://www.netmba.com/statistics/distribution/normal/

Use the normal distribution tab in your "distributions" spreadsheet to answer the following questions

The target value for the thickness of a machined cylinder is 8cm. The upper specification limit is 8.2cm and the lower specification limit is 7.9cm. A machine produces cylinders that have a mean thickness of 8.1cm an d a standard deviation of 0.1cm.

1. What is the probability that the thickness of a randomly selected cylinder:

   a) Is within specification?
   b) Exceeds the target value?
   c) Is less than the lower specification limit?

2. What are the quartile values Q1, Q2, Q3, and Q4?

The annual rainfall in a certain area is normally distributed with a mean of 25 inches and a standard deviation of 5 inches. The following questions ask you to compute probabilities and quantiles from a normal distribution.

3. What is the probability the area receives at least 30 inches of rain in a year? What is the Z-score corresponding to 30? Do you need to compute Z to obtain P(X>30)? Why or why not?

4. What is the probability the area receives between 15 and 30 inches of rain in a year?

5. What is the probability the area receives at most 20 inches of rain in a year? Why is this answer the same as the answer for Question 3?

6. Suppose you know P(X>30) = 0.21 and the mean is 25. What is the standard deviation? Why is this probability greater than that in Question#3?

7. Suppose you know P(X>30) = 0.0548 and the standard deviation is 5. What is the mean? Why is this probability less than that in Question #3?

A large corporation has (on the average) 5 absences per 100 employees per day and a standard deviation of 1 absence. After a health improvement program, the mean number of absences was reduced to 4 absences per 100 employees and the standard deviation was reduced to 0.8 absence.

8. What is the probability prior to the health improvement program that the number of absences per 100 employees on a randomly selected day is greater than 6?

9. What is the probability prior to the health improvement program that the number of absences per 100 employees on a randomly selected day is less than 3.5?

10. What is the probability after the health improvement program that the number of absences per 100 employees on a randomly selected day is greater than 6? Compare this probability to that in Question #8 and discuss.

11. What is the probability after the health improvement program that the number of absences per 100 employees on a randomly selected day is less than 3.5? Compare this probability to that in Question 9 and discuss.

12. One program objective was to have fewer than 5 absences per 100 employees for at least 90% of the days. What this objective achieved? Explain.

Answer Clues

1a) ~81.9%
b) ~84.1%
c) ~2.3%

2) 8.0325, 8.1, 8.1675, and 8.5cm

3) 15.9%. No.

4) 81.9%

5) 15.9%.

6) $\sigma \sim 6.2$.

7) $\mu = 22$.

8) 15.9%

9) 6.7%

10) 0.6%

11) 26.6%

12) Not quite.