Algebra II/Trig B

HW 9.10

1. Use a table of standard normal probabilities to find the following:
   a. The area to the left of $z = 1.88$
   b. The area to the left of $z = -0.39$
   c. The area to the right of $z = 1.42$
   d. The area to the right of $z = -0.46$
   e. The area between $z = -1.22$ and $z = -0.5$

2. Suppose that a particular medical procedure has a cost that is approximately normally distributed with a mean of $\$19{,}800$ and a standard deviation of $\$2{,}900$. For a randomly selected patient, use a table of standard normal probabilities to help find the probabilities of the following events. (Round your answers to the nearest ten-thousandth.)
   a. The procedure costs between $\$18{,}000$ and $\$22{,}000$.
   b. The procedure costs less than $\$15{,}000$.
   c. The procedure costs more than $\$17{,}250$.
   d. If you choose 200 patients at random, how many would you expect to find that paid more than $17,250 for the procedure?

3. Consider the medical procedure described in the previous question, and suppose a patient is charged $\$24{,}900$ for the procedure. The patient is reported as saying, "I've been charged an outrageous amount!" How justified is this comment? Use probability to support your answer.

4. Think again about the medical procedure described in Problem 2.

Rounding your answers to the nearest thousandth, find the probability of each instance for a randomly selected patient. Use the table of standard normal probabilities.

a. The cost of the procedure is within two standard deviations of the mean cost.

b. The cost of the procedure is more than one standard deviation from the mean cost.

5. Use a table of standard normal curve areas to find the following:

a. The area to the left of $z = 0.56$

b. The area to the right of $z = 1.20$

c. The area between $z = -1.39$ and $z = 0.80$

d. The area to the right of $z = -0.35$

e. The area to the left of $z = -1.47$

6. Suppose the distribution of GPAs at Jefferson High School has a mean of 2.7 and a standard deviation of 0.37. The GPAs at Washington High School has a mean of 2.8 and a standard deviation of 0.33.

   a. Ted, a student at Washington High School, has a GPA of 3.25. Calculate his z-score and interpret it in context.

   b. Frank, at Jefferson High School, has a GPA of 3.17. Calculate his z-score and interpret it in context.

   c. Which of them has the higher GPA relative to his peers (at his school)? Justify using z-scores.

   d. What GPA would Ted need to have the same z-score as Frank?

7. Data from the National Vital Statistics Report reveal that the distribution of the duration of human pregnancies (i.e., the number of days between conception and birth) is approximately normal with mean μ = 270 and standard deviation σ = 15. Use the table of standard normal probabilities to determine the probability that a given pregnancy comes to term in:

   a. less than 244 days (which is about 8 months).

   b. more than 275 days (which is about 9 months).

   c. over 300 days.

   d. between 260 and 280 days.

8. Suppose that Professors Wells and Zeddes have final exam scores that are approximately normally distributed with mean 75. The standard deviation of Wells' scores is 10, and that of Zeddes' scores is 5.

a. With which professor is a score of 90 more impressive? Support your answer with z-scores.

b. With which professor is a score of 60 more discouraging? Again support your answer with z-scores.

Answers

1) a)0.9699 b) 0.0778 c) 0.3483 d) 0.6772 e) 0.1973
2) a) 0.5088 b) 0.0485 c) 0.8106 d) About 162 patients.
3) It is somewhat justified. His procedure has a cost that is 1.76 standard deviations above the mean. About 96% of procedures are cheaper than his procedure.
4) a) 0.954 b) 0.317
5) a) 0.7123 b) 0.1151 c) 0.7058 d) 0.6368 e) 0.0708
6) a) z = 1.36; his gpa is 1.36 standard deviations above the mean gpa at Washington
   b) z= 1.27; his gpa is 1.27 standard deviations above the mean gpa at Jefferson
   c) Ted's gpa is higher for his school. His z-score is higher.
   d) Ted would need a 3.22 GPA.
7) a) 0.0418 b) 0.3707 c) 0.0228 d) 0.4972
8) a) Professor Zeddes. In his class a score of 90 has a higher z-score.
   b) Professor Zeddes. In his class a score of 60 has a lower z-score.