Provide an appropriate response.

1) Two random variables are normally distributed with the same mean. One has a standard deviation of 10 while the other has a standard deviation of 15. How will the graphs of the two variables differ and how will they be alike?

2) Which is larger, the area under the standard normal curve between -1 and 1, or the area under the standard normal curve between 0 and 2? Explain your reasoning.

3) Which of the variables below do you think will be roughly normally distributed?
   a. Weights of 10 year old boys
   b. Incomes of 40 year old adults
   c. The numbers that show up when you roll a balanced die
   d. The amount of coffee which a filling machine puts into "4 ounce jars"

Fill in the blanks by standardizing the normally distributed variable.

4) Dave drives to work each morning at about the same time. His commute time is normally distributed with a mean of 42 minutes and a standard deviation of 4 minutes. The percentage of time that his commute time lies between 50 and 54 minutes is equal to the area under the standard normal curve between ___ and ___.

Use a table of areas to find the specified area under the standard normal curve.

5) The area that lies between 0 and 3.01

6) The area that lies between -1.10 and -0.36

Use a table of areas for the standard normal curve to find the required z-score.

7) Find the z-score for having area 0.07 to its right under the standard normal curve, that is, find \( z \) \(_{0.07} \).

8) Find the z-score for which the area under the standard normal curve to its left is 0.04

9) Determine the two z-scores that divide the area under the standard normal curve into a middle 0.874 area and two outside 0.063 areas.

Find the indicated probability or percentage for the normally distributed variable.

10) The variable X is normally distributed. The mean is \( \mu = 15.2 \) and the standard deviation is \( s = 0.9 \). Find \( P(X > 16.1) \).

11) The diameters of bolts produced by a certain machine are normally distributed with a mean of 0.30 inches and a standard deviation of 0.01 inches. What percentage of bolts will have a diameter smaller than 0.32 inches?
12) A bank's loan officer rates applicants for credit. The ratings are normally distributed with a mean of 200 and a standard deviation of 50. If an applicant is randomly selected, find the probability of a rating that is between 200 and 275.

13) The systolic blood pressure of 18-year-old women is normally distributed with a mean of 120 mmHg and a standard deviation of 12 mmHg. What percentage of 18-year-old women have a systolic blood pressure that lies within 3 standard deviations to either side of the mean?

Find the specified percentile, quartile, or decile.

14) The annual precipitation for one city is normally distributed with a mean of 39.2 inches and a standard deviation of 2.6 inches. Find the 2nd decile. This is the same as the 20th percentile.

15) A bank's loan officer rates applicants for credit. The ratings are normally distributed with a mean of 200 and a standard deviation of 50. Find the 6th decile. This is the same as the 60th percentile.

Provide an appropriate response.

16) True or false, areas under the standard normal curve cannot be negative, whereas z-scores can be positive or negative?

17) Most problems involving normally distributed variables are one of two types.

Type A: Find a probability or percentage, e.g. find the probability that X lies in a specified range.

Type B: Find the observation corresponding to a given probability or percentage.

Suppose that scores on a test are normally distributed with a mean of 80 and a standard deviation of 8. Which of the following questions below are of type B?

a. Find the 80th percentile.
b. Find the cutoff for the A grade if the top 10% get an A.
c. Find the percentage scoring more than 90.
d. Find the score that separates the bottom 30% from the top 70%.
e. Find the probability that a randomly selected student will score more than 80.

You wish to approximate a binomial probability by an area under a normal curve. Use the continuity correction to determine which area under the appropriate normal curve will approximate the required probability.

18) The probability of more than 49 correct answers

19) The probability of fewer than 48 democrats

For the binomial distribution with the given values for n and p, state whether or not it is suitable to use the normal distribution as an approximation.

20) n = 27 and p = 0.6

21) n = 19 and p = 0.8
Estimate the indicated probability by using the normal distribution as an approximation to the binomial distribution.

22) Estimate the probability of getting exactly 43 boys in 90 births.

23) A certain question on a test is answered correctly by 22% of the respondents. Estimate the probability that among the next 150 responses there will be at most 40 correct answers.

Provide an appropriate response.

24) Fill in the blanks.
A fair coin is flipped 280 times. You wish to find the probability that the number of tails is greater than 160. This probability can be estimated by finding the area to the right of _____ under the normal curve with $\mu =$ _____ and $\sigma =$ ____. 
1) Both graphs will have the same shape (they will both be bell-shaped) and they will be centered at the same place (the common mean). The graph of the variable with the smaller standard deviation will be narrower and taller than the other graph.

2) Answers will vary. Possible answer: The area under the standard normal curve between -1 and 1 is larger. The area under the curve between 0 and 1 is common to both areas. The area under the curve between -1 and 0 is larger than the area under the curve between 1 and 2 because it is closer to the mean.

3) a and d

4) 2, 3

5) 0.4987

6) 0.2237

7) 1.48

8) -1.75

9) -1.53, 1.53

10) 0.1587

11) 97.72%

12) 0.4332

13) 99.74%

14) 37.016 inches

15) 212.5

16)

17) a, b, d

18) The area to the right of 49.5

19) The area to the left of 47.5

20) Normal approximation is suitable.

21) Normal approximation is not suitable.

22) 0.0764

23) 0.9306

24) 160.5, 140, 8.37