1. A company conducted a survey of its employees to determine their level of satisfaction with various company policies. The data collected from this survey are:

a. secondary data.
b. experimental data.
c. primary data.
d. census data.
e. observational data

2. When a survey uses the responses strongly disagree, disagree, neutral, agree, strongly agree, this is an example of:

a. nominal data.
b. ordinal data.
c. interval data.
d. ratio data.
e. time series data

3. Recently a study of fans attending the New York Mets baseball games was conducted and 500 fans were surveyed. In forming a frequency distribution of the number of miles fans traveled from home to the stadium, it was found that 247 fans traveled between 0 and 5 miles. Based on this information what was the relative frequency for this class?

$247/500 = 0.494$

a. 0.247
b. 0.30
c. 0.738
d. 0.494
e. can't be determined without more information.

4. One of the key differences between a bar chart and histogram is:

a. the histogram contains gaps between the bars and the bar chart does not.
b. the histogram shows relative frequency while the bar chart shows frequency.
c. the bar chart must be vertical while the histogram must be horizontal.
d. a bar chart is used to display a numerical variable and a histogram is used to display the distribution of a qualitative variable.
e. a bar chart is used to display a categorical variable and a histogram is used to display the distribution of a quantitative variable.

5. Which of the following is true about the difference between stem and leaf diagrams and histograms?

a. There is no difference.
b. The histogram shows the shape center and spread of the distribution while the stem and leaf does not.
c. The stem and leaf diagram shows less information than a histogram.
d. From the histogram the actual data can be retrieved.
e. The stem and leaf diagram shows more information by showing the individual values.

6. The number of days that homes stay on the market before they sell in Seattle is bell-shaped with a mean equal to 8 days. Further, 95 percent of all homes are on the market between 2 and 14 days. Based on this information, what is the standard deviation for the number of days that houses stay on the market in Seattle?

a. 12
b. 16
c. 9
d. 3
e. 10

$\mu + 2\sigma = 14 \Rightarrow 8 + 2\sigma = 14 \Rightarrow \sigma = 3$

or $\mu - 2\sigma = 2 \Rightarrow 8 - 2\sigma = 2 \Rightarrow \sigma = 3$

7. The asking price for homes on the real estate market in Baltimore has a mean value of $286,455 and a standard deviation of $11,200. Four homes are listed by one real estate company with the following prices:

Home 1: $456,900 Home 2: $306,000 Home 3: $266,910 Home 4: $201,456

Based upon this information, which house has a standardized value that is relatively closest to zero?

a. Home 1
b. Home 2
c. Home 2 and home 3
d. Home 3
e. Home 1 and home 3

$\bar{X} = 265205.25$

$S = 363,609.51$

For Home 2: $Z = 0.1122$

For Home 3 = $Z = 0.0047$

$Z = \frac{X - \mu}{\sigma}$

8. Portfolio A of a collection of stocks is considered more risky than portfolio B if:

a. portfolio A has a higher coefficient of variation than portfolio B.
b. portfolio A has a higher mean than portfolio B.
c. portfolio A has a higher variance than portfolio B.
d. portfolio A has a higher standard deviation.
e. portfolio A has a higher median than portfolio B.

9. The Jack In The Box franchise in Bangor, Maine, has determined that the chance a customer will order a soft drink is 0.90. The probability that a customer will order a hamburger is 0.60. The probability that a customer will order french fries is 0.50. The restaurant has also determined that if a customer orders a hamburger, the probability the customer will also order fries is 0.80. Determine the probability that the order will include a hamburger and fries.

a. 0.45
b. 0.58
c. 0.68
d. 0.48
e. 0.30

$P(S) = .90,\ P(H) = .60,\ P(F) = .5$

$P(F|H) = .8$

$P(H \cap F) = P(H) \cdot P(F|H)$

$= .6 \times .8 = .48$

10. The college basketball team at West Texas State University has 10 players; 5 are seniors, 2 are juniors, and 3 are sophomores. Two players are randomly selected to serve as captains for the next game. What is the probability that both players selected are seniors?

a. 0.22
b. 0.33
c. 0.50
d. 0.66
e. 0.42

$$\frac{\binom{5}{2}\binom{5}{0}}{\binom{10}{2}} = \frac{10}{45} = 0.22$$

11. The URS construction company has submitted two bids, one to build a large hotel in London and the other to build a commercial office building in New York City. The company believes it has a 40% chance of winning the hotel bid and a 25% chance of winning the office building bid. The company also believes that winning the hotel bid is independent of winning the office building bid. What is the probability the company will win at least one contract?

a. 0.45
b. 0.55
c. 0.10
d. 0.75
e. 0.65

$P(H) = .4,\ P(O) = .25$

$P(H \cup O) = P(H) + P(O) - P(H \cap O)$

$= .4 + .25 - .4 \times .25 = .55$

12. A distributor of outdoor yard lights has four suppliers. This past season she purchased 40% of the lights from Franklin Lighting, 30% from Wilson & Sons, 20% from Evergreen Supply, and the rest from A. L. Scott. In prior years, 3% of Franklin's lights were defective, 6% of the Wilson lights were defective, 2% of Evergreen's were defective, and 8% of the Scott lights were defective. When the lights arrive at the distributor, she puts them in inventory without identifying the supplier. Suppose that a defective light string has been pulled from inventory; what is the probability that it was supplied by Franklin Lighting?

a. 0.33
b. 0.45
c. 0.29
d. 0.18
e. 0.57

Let B_1: Franklin, B_2: Wilson
B_3: Evergreen, B_4: Scott.
and A: Defective.

$$P(B_1|A) = \frac{P(B_1 \cap A)}{P(A)}$$

$$= \frac{.4 \times .03}{.4 \times .03 + .3 \times .06 + .2 \times .02 + .1 \times .08} = 0.29$$

13. The number of cars sold (x) in a day at Smitty's Auto Sales is described by the probability distribution in the following table:

X	0	1	2	3	4	5	
P(X)	0.18	0.39	0.24	0.14	0.04	0.01	

Compute the variance and standard deviation of the number of cars sold.

a. Variance=1.25, standard deviation=1.118
b. Variance=1.86, standard deviation=1.364
c. Variance=2.25, standard deviation=1.50
d. Variance=1.118, standard deviation=1.057
e. Variance=1.50, standard deviation=1.225

$\sigma^2 = E(x^2) - \mu^2$

$= 3.5 - (1.5)^2 = 1.25$

$\sigma = \sqrt{1.25} = 1.118$

$\mu = \Sigma x p(x)$

$\sigma^2 = \Sigma x^2 p(x) - \mu^2$

14. The Vardon Exploration Company is getting ready to leave for South America to explore for oil. One piece of equipment requires 10 batteries that must operate for more than 2 hours. The batteries being used have a 15 percent chance of failing within 2 hours. The exploration leader plans to take 12 batteries. The probability that the supply of batteries will contain enough good ones to operate the equipment is:

a. 0.2642
b. 0.7358
c. 0.0132
d. 0.9964
e. 0.9551

$n = 12, \; p = .85$

$P(X \geq 10) = \sum_{x=10}^{12} \binom{n}{x} p^x (1-p)^{n-x}$

$= .7358$

15. The mean number of errors per page made by a member of the word processing pool for a large company is thought to be 1.5 with the number of errors distributed according to a Poisson distribution. If three pages are examined, what is the probability that more than 3 errors will be observed?

a. 0.6577
b. 0.6969
c. 0.7324
d. 0.7860
e. 0.5763

$\lambda = 1.5/page, \; t = 3$

$P(X > 3) = 1 - P(X \leq 3)$

$= 1 - \sum_{x=0}^{3} \frac{(\lambda t)^x e^{-\lambda t}}{x!}$

$= 1 - .3423 = .6577$

16. A corporation has 11 manufacturing plants. Of these, 7 are domestic and 4 are located outside the United States. Each year a performance evaluation is conducted for 4 randomly selected plants. What is the probability that a performance evaluation will contain 3 plants from the United States?

a. 0.3776
b. 0.3523
c. 0.4696
d. 0.6145
e. 0.4242

$N = 11, \; n = 4, \; K = 7$

$P(X=3) = \binom{7}{3}\binom{11-7}{4-3} \Big/ \binom{11}{4}$

$= \frac{140}{330} = 0.4242$

17. Students who have completed a speed reading course have reading speeds that are normally distributed with a mean of 950 words per minute and a standard deviation equal to 220 words per minute. Based on this information, what is the probability of a student reading at more than 1400 words per minute after finishing the course?

a. 0.5207
b. 0.4798
c. 0.9798
d. 0.0202
e. 0.8372

$$P(X > 1400) = P\left(Z > \frac{1400 - 950}{220}\right)$$

$$= 1 - P(Z \leq 2.05)$$

$$= 1 - .9798 = .0202$$

18. A professor noted that the grades of his students were normally distributed with a mean of 75.07 and a standard deviation of 11.65. If only 10 percent of the students received grades of A+, what is the minimum score needed to receive an A+?

a. 80.00
b. 85.00
c. 90.00
d. 95.00
e. 75.00

$$P(X > x) = .1$$

$$\Rightarrow P(X \leq x) = .9$$

$$\frac{x - \mu}{\sigma} = z \Rightarrow x = \mu + \sigma z$$

$$\Rightarrow x = 75.07 + 11.65(1.28)$$

$$= 89.982 \approx 90$$

19. It is assumed that the time customers spend in a record store is uniformly distributed between 3 and 12 minutes. Based on this information, what is the probability that a customer will spend more than 9 minutes in the record store?

a. 0.33
b. 0.1111
c. 0.67
d. 0.25
e. 0.4117

$$P(X>9) = \int_9^{12} \frac{1}{9}\,dx$$

$$= \frac{1}{9}(12-9) = \frac{1}{3} = 0.33$$

20. The time between calls to an emergency 911-call center is exponentially distributed with a mean time between calls of 645 seconds. Based on this information, what is the probability that the time between the next two calls is between 200 and 400 seconds?

a. Approximately 0.47
b. About 0.196
c. About 0.747
d. About 0.801
e. Approximately 0.661

$$P(200 < X < 400)$$

$$= P(X < 400) - P(X \leq 200)$$

$$= 1 - e^{-400/645} - \left[1 - e^{-200/645}\right]$$

$$= -e^{-0.6202} + e^{-0.3101} = -.5378 + .7534$$

$$= .1956$$