

- (9) 1. Answer True (T) or False (F):
- (a) The thickness of a sheet of metal is an example of a quantitative variable. \_\_\_\_\_
  - (b) Circle graphs and bar graphs are used to summarize quantitative data. \_\_\_\_\_
  - (c) The concepts of probability and relative frequency as related to an event are very similar. \_\_\_\_\_
  - (d) Chebyshev's Theorem says that at least 89% of data is found within 2 standard deviations of the mean. \_\_\_\_\_
  - (e) For a bell-shaped distribution, the range will approximately equal six standard deviations. \_\_\_\_\_
  - (f) If two events are mutually exclusive, they can not be independent. \_\_\_\_\_
  - (g) The binomial parameter  $p$  is the probability of one success in  $n$  trials. \_\_\_\_\_
  - (h) If a random variable  $z$  is the standard normal score, then  $z(0.25) = P_{75}$ . \_\_\_\_\_
  - (i) The shape of the distribution of sample means is always that of a normal distribution. \_\_\_\_\_
- (4) 2. At a large community college, 120 students were randomly selected and asked the distance of their commute to campus. From this group a mean of 9.8 miles was computed. Match the items in Column II with the statistical terms in Column I.

**Column I****Column II**

- |               |  |
|---------------|--|
| 1. Data (one) | a. The process used to select the 120 students               |
| 2. Data (set) | b. The computed 9.8 miles                                    |
| 3. Experiment | c. All students enrolled in the college                      |
| 4. Parameter  | d. The 120 commute distances                                 |
| 5. Population | e. The 120 students  |
| 6. Sample     | f. The commute distance for one student                      |
| 7. Statistic  | g. 8 miles distance for one student                          |
| 8. Variable   | h. The mean commute distance for all students in the college |
- (3) 3. A department of 30 people is to select a committee of 5 persons. How many different committees are possible if the committee is composed of a chairperson, a secretary, and three others?
- (11) 4. A group of ten children had the following heights in inches:
- 45, 46, 42, 56, 37, 50, 50, 50, 47, 47
- (a) Rank the data and find the mean, median, mode, and range.
  - (b) Give the 5-number summary and draw a box and whiskers plot.
- (3) 5. For two events  $A$  and  $B$ ,  $P(A) = 0.2$  and  $P(B) = 0.3$ . If  $A$  and  $B$  are independent, then
- (a)  $P(A \cap B) =$

(b)  $P(A \cup B) =$

(c)  $P(A|B) =$

- (3) 6. A card is selected at random from a standard 52-card deck.

- (a) What is the probability that it is an ace?  
 (b) What is the probability that it is a heart?  
 (c) What is the probability that it is an ace or a heart?

- (16) 7. A sample of freshwater American fishermen produced the following age distribution.

| Age<br>(Class limits) | #Fishermen<br>$f$ | Class Mark<br>( $x$ ) | $xf$ | $x^2 f$ | Cumulative<br>Freq. | Cum. Rel.<br>Freq. |
|-----------------------|-------------------|-----------------------|------|---------|---------------------|--------------------|
| 15–25                 | 13                |                       |      |         |                     |                    |
| 25–35                 | 20                |                       |      |         |                     |                    |
| 35–45                 | 28                |                       |      |         |                     |                    |
| 45–55                 | 20                |                       |      |         |                     |                    |
| 55–65                 | 10                |                       |      |         |                     |                    |
| 65–75                 | 9                 |                       |      |         |                     |                    |

- (a) Complete the table above and find the mean and standard deviation for this distribution.  
 (b) Draw a histogram and ogive for the distribution.

- (3) 8. The following table lists the probabilities associated with smoking and lung disease among 60-65 year-old men.

| Lung Disease         | Smoker (C) | Nonsmoker (D) |
|----------------------|------------|---------------|
| Has Lung Disease (A) | 0.1        | 0.03          |
| No Lung Disease (B)  | 0.17       | 0.7           |

Suppose a 60-65 year-old man is randomly selected from this particular population.

- (a) What is the probability that he is a smoker?  
 (b) What is the probability that he does not have lung disease?  
 (c) What is the probability that he has lung disease given that he does not smoke?

- (6) 9. A box contains one green, two yellow and three red cards. Two cards are randomly chosen
- without replacement**
- .

- (a) Draw a tree diagram and assign probabilities to each branch.  
 (b) Consider the events:  $\mathbf{B}$  : {at least one card is yellow},  $\mathbf{C}$  : {Both cards are red} and  $\mathbf{D}$  : {Both cards are of the same color} find the following:

$P(B) =$

$P(\overline{B}) =$

$P(C) =$

$P(D|B) =$

- (6) 10. Consider the probability function
- $P(x) = \frac{x^2 + 5}{50}$
- , for
- $x = 1, 2, 3, 4$
- .

- (a) Find the mean and the standard deviation, using an extension table.
- (b) What is the probability that  $x$  is between  $\mu - \sigma$  and  $\mu + \sigma$ ?
- (6) 11. A biologist is studying a new hybrid tomato. It is known that the seeds of this hybrid tomato have probability 0.7 of germinating. The biologist plants 10 seeds.
- (a) What is the probability that exactly 8 seeds will germinate?
- (b) What is the probability that at least 8 seeds will germinate?
- (c) Find the mean and standard deviation of the number of seeds germinating.
- (3) 12. A statistics professor finds that when she schedules an office hour for student help, an average of 3.2 students arrive. What is the probability that at a randomly selected office hour, the number of student arrivals is five? (Use the Poisson distribution.)
- (4) 13. Draw a picture, shade the area which is represented, and evaluate:
- (a)  $P(-1.21 < z < 2.44)$
- (b)  $P(z < -0.94)$
- (c)  $z(0.67)$
- (d)  $t(30, 0.90)$
- (4) 14. A house cleaning agency claims that only 10% of all their clients are dissatisfied with their services. What is the probability that more than 20 of their 150 clients will be dissatisfied with their services? (Use the normal approximation of the binomial distribution.)
- (5) 15. Suppose that the average speed of drivers on a certain street is 55 km/hr and that driving speeds are approximately normally distributed with a standard deviation of 2.5 km/hr. Find the probability that the **mean** of a random sample of 10 drivers is between 53 km/hr and 54.5 km/hr.
- (3) 16. Determine the sample size needed to estimate the population mean if we want a maximum error of 1.4 with 90% confidence. Assume a normal distribution and that the population standard deviation is 10.
- (7) 17. Suppose a sample of 71 college students has a mean height of 170 centimeters.
- (a) Give a point estimate for the population mean  $\mu$ .
- (b) If the population standard deviation is  $\sigma = 20$ , find the 99% confidence interval for  $\mu$ .
- (c) If  $\sigma$  is unknown, but the sample standard deviation is  $s = 18$ , find the 95% confidence interval for  $\mu$ .
- (4) 18. A survey was conducted to determine the proportion of companies that provide life insurance coverage for their employees. Of the one hundred and five companies polled, forty-two responded yes. Construct a 98% confidence interval for the true proportion of companies that provide life insurance coverage for their employees.