

Part I. MULTIPLE CHOICE. (2 points each) Choose the one alternative that best completes the statement or answers the question. Place your answers in the answer column on the test copy and on the appropriate line on the separate answer sheet.

**Solve the problem.**

- 1) If sample points  $A, B, C,$  and  $D$  are the only possible outcomes of an experiment, find the probability of  $D$  using the table below. 1) \_\_\_\_\_

Sample Point	$A$	$B$	$C$	$D$
Probability	$1/10$	$1/10$	$1/10$	

- A)  $\frac{3}{10}$                                       B)  $\frac{1}{10}$                                       C)  $\frac{1}{4}$                                       D)  $\frac{7}{10}$

- 2) A bag of colored candies contains 20 red, 25 yellow, and 35 orange candies. An experiment consists of randomly choosing one candy from the bag and recording its color. What is the sample space for this experiment? 2) \_\_\_\_\_

- A) {20, 25, 35}                                      B) {1/4, 5/16, 7/16}  
 C) {red, yellow, orange}                                      D) {80}

- 3) A hospital reports that two patients have been admitted who have contracted Crohn's disease. Suppose our experiment consists of observing whether each patient survives or dies as a result of the disease. The simple events and probabilities of their occurrences are shown in the table (where  $S$  in the first position means that patient 1 survives,  $D$  in the first position means that patient 1 dies, etc.). 3) \_\_\_\_\_

Simple Events	Probabilities
$SS$	0.58
$SD$	0.20
$DS$	0.16
$DD$	0.06

Find the probability that at least one of the patients does not survive.

- A) 0.20                                      B) 0.42                                      C) 0.36                                      D) 0.06

- 4) The table displays the probabilities for each of the outcomes when three fair coins are tossed and the number of heads is counted. Find the probability that the number of heads on a single toss of the three coins is at most 2. 4) \_\_\_\_\_

Outcome	0	1	2	3
Probability	.125	.375	.375	.125

- A) .750                                      B) .125                                      C) .500                                      D) .875

- 5) The table displays the probabilities for each of the six outcomes when rolling a particular unfair die. Suppose that the die is rolled once. 5) \_\_\_\_\_

Outcome	1	2	3	4	5	6
Probability	.1	.1	.1	.2	.2	.3

Events  $A$ ,  $B$ ,  $C$ , and  $D$  are defined as follows.

$A$ : {The number is even}

$B$ : {The number is less than 4}

$C$ : {The number is less than or equal to 5}

$D$ : {The number is greater than or equal to 5}

Identify one pair of independent events.

A)  $B$  and  $D$

B)  $A$  and  $B$

C)  $A$  and  $D$

D)  $B$  and  $C$

- 6) Consider the given discrete probability distribution. Find  $P(x > 3)$ . 6) \_\_\_\_\_

$x$	1	2	3	4	5
$p(x)$	.1	.2	.2	.3	.2

A) .7

B) .5

C) .2

D) .3

- 7) A recent survey found that 60% of all adults over 50 wear glasses for driving. In a random sample of 100 adults over 50, what is the mean and standard deviation of the number who wear glasses? 7) \_\_\_\_\_

A) mean: 60; standard deviation: 4.9

B) mean: 40; standard deviation: 4.9

C) mean: 40; standard deviation: 7.75

D) mean: 60; standard deviation: 7.75

- 8) Use the standard normal distribution to find  $P(0 < z < 2.25)$ . 8) \_\_\_\_\_

A) .5122

B) .8817

C) .7888

D) .4878

- 9) Use the standard normal distribution to find  $P(-2.25 < z < 0)$ . 9) \_\_\_\_\_

A) .6831

B) .0122

C) .5122

D) .4878

- 10) Use the standard normal distribution to find  $P(-2.25 < z < 1.25)$ . 10) \_\_\_\_\_

A) .8821

B) .8944

C) .0122

D) .4878

- 11) Find a value of the standard normal random variable  $z$ , called  $z_0$ , such that  $P(z \leq z_0) = 0.70$ . 11) \_\_\_\_\_

A) .98

B) .53

C) .47

D) .81

- 12) A physical fitness association is including the mile run in its secondary-school fitness test. The time for this event for boys in secondary school is known to possess a normal distribution with a mean of 450 seconds and a standard deviation of 60 seconds. Find the probability that a randomly selected boy in secondary school can run the mile in less than 312 seconds. 12) \_\_\_\_\_

A) .5107

B) .4893

C) .0107

D) .9893

- 13) A physical fitness association is including the mile run in its secondary-school fitness test. The time for this event for boys in secondary school is known to possess a normal distribution with a mean of 450 seconds and a standard deviation of 50 seconds. The fitness association wants to recognize the fastest 10% of the boys with certificates of recognition. What time would the boys need to beat in order to earn a certificate of recognition from the fitness association? 13) \_\_\_\_\_  
 A) 532.25 seconds      B) 514 seconds      C) 386 seconds      D) 367.75 seconds
- 14) The tread life of a particular brand of tire is a random variable best described by a normal distribution with a mean of 60,000 miles and a standard deviation of 2300 miles. What is the probability a particular tire of this brand will last longer than 57,700 miles? 14) \_\_\_\_\_  
 A) .8413      B) .1587      C) .7266      D) .2266
- 15) Suppose a random variable  $x$  is best described by a normal distribution with  $\mu = 60$  and  $\sigma = 11$ . Find the  $z$ -score that corresponds to the value  $x = 71$ . 15) \_\_\_\_\_  
 A) 1      B)  $\frac{60}{11}$       C) 11      D) 71
- 16) IQ test scores are normally distributed with a mean of 98 and a standard deviation of 15. An individual's IQ score is found to be 122. Find the  $z$ -score corresponding to this value. 16) \_\_\_\_\_  
 A) 1.60      B) -0.62      C) -1.60      D) 0.63
- 17) Which of the following statements is not a property of the normal curve? 17) \_\_\_\_\_  
 A)  $P(\mu - \sigma < x < \mu + \sigma) \approx .95$       B)  $P(\mu - 3\sigma < x < \mu + 3\sigma) \approx .997$   
 C) mound-shaped (or bell shaped)      D) symmetric about  $\mu$
- 18) Which one of the following suggests that the data set is approximately normal? 18) \_\_\_\_\_  
 A) A data set with  $Q_1 = 105$ ,  $Q_3 = 270$ , and  $s = 33$ .  
 B) A data set with  $Q_1 = 14$ ,  $Q_3 = 68$ , and  $s = 41$ .  
 C) A data set with  $Q_1 = 2.2$ ,  $Q_3 = 7.3$ , and  $s = 2.1$ .  
 D) A data set with  $Q_1 = 1330$ ,  $Q_3 = 2940$ , and  $s = 2440$ .
- 19) If a data set is normally distributed, what is the proportion of measurements you would expect to fall within  $\mu \pm \sigma$ ? 19) \_\_\_\_\_  
 A) 95%      B) 100%      C) 68%      D) 50%
- 20) The weight of corn chips dispensed into a 16-ounce bag by the dispensing machine has been identified as possessing a normal distribution with a mean of 16.5 ounces and a standard deviation of 0.2 ounce. What proportion of the 16-ounce bags contain more than the advertised 16 ounces of chips? 20) \_\_\_\_\_  
 A) .4938      B) .5062      C) .0062      D) .9938

Part II. EXERCISES. (5 points each) Address each exercise on the separate answer sheet. Carefully say how you determined your answers. Also, be sure to state your conclusions in complete English sentences.

21) About 40% of the general population donate time and energy to community projects. 21) \_\_\_\_\_  
Suppose 15 people have been randomly selected from a community and each asked whether he or she donates time and energy to community projects. Let  $x$  be the number who donate time and energy to community projects. (a) Find the mean and standard deviation for  $x$ . (b) Find the probability that more than five of the 15 donate time and energy to community projects.

22) The following data represent the scores of a sample of 50 students on a statistics exam. The mean score is  $\bar{x} = 80.3$ , and the standard deviation is  $s = 11.37$ . 22) \_\_\_\_\_

49	51	59	63	66	68	68	69	70	71
71	71	73	74	76	76	76	77	78	79
79	79	79	80	80	82	83	83	83	85
85	86	86	88	88	88	88	89	89	89
90	91	92	92	93	95	96	97	97	98

What percentage of the scores fall in each of the intervals  $\bar{x} \pm s$ ,  $\bar{x} \pm 2s$ , and  $\bar{x} \pm 3s$ ? Based on these percentages, do you believe that the distribution of scores is approximately normal? Explain.