SECTION I (45points)

1. If every value in a data set is '4', then the standard deviation is:

   A. $\sqrt{2}$ B. 0 C. 4 D. 2

2. Which of the following is a measure of dispersion?
   A. percentile
   B. midrange
   C. mean
   D. standard deviation

3. A random sample for the height and weight of 10 college women were taken. and the calculated correlation coefficient (r) is positive. It means, in general,

   A. If the height increases the weight decreases
   B. If the height increases the weight increases
   C. If the height increases the weight remains constant
   D. If the height decreases the weight increases

4. Consider the equation of line of best fit

   $\hat{y} = 14.9 + 0.66\,x$

   relating the push-ups (x) and sit-ups(y) of high schools junior students. If a student is able to do 38 push-ups, then the model predicts the number of sit-ups that the student would be able to do:

   A. 40 sit-ups
   B. 43 sit-ups
   C. 45 sit-ups
   D. 102 sit-ups

5. If P(E) is the probability that an event will occur, which of the following must be false?
   A. P(E) = 1
   B. P(E) = 1/2
   C. P(E) = –1
   D. P(E) = 1/3

6. A pair of dice is rolled and the resulting sum of numbers is odd. Which of the following events is the complement of this event?
   A. A sum of numbers greater than 8
   B. A sum of numbers less than 5
   C. A sum of numbers that is a multiple of 5

D. An even sum of numbers

7. A multiple-choice test has five questions, each with two choices for the answer. Only one of the choices is correct. You randomly guess the answer to each question. What is the probability that all of your answers are correct?
   A. 0.04
   B. 0.02
   C. 0.03125
   D. 0.03215

8. A bottle contains red and blue marbles. Odds in favor of choosing a red marble from the bottle are 3 to 5. What is the probability that a randomly selected marble is red?
   A. 3/8 B. 3/5 C. 5/8 D. 1/3

9. If X is a normally distributed random variable with mean μ and standard deviation σ, then X can be written in terms of Z (where Z is the standard normal random variable) as follows:

   A. $\sigma + \mu Z$
   B. $\mu + \sigma Z$
   C. $\frac{z - \mu}{\sigma}$
   D. $\frac{z - \sigma}{\mu}$

10. For the standard normal random variable Z, what does z(0.75) equal?
    A. + 0.25 B. – 0.44 C. + 0.67 D. – 0.67

11. What happens to the mean and standard deviation of $\bar{x}$ as the sample size decreases?
    A. The mean remains the same and the standard deviation increases
    B. The mean remains the same and the standard deviation decreases
    C. The mean increases and the standard deviation decreases
    D. The mean decreases and the standard deviation increases

12. If a population has a standard deviation σ = 299.7, what is the standard deviation of the sample mean when a sample of size 81 is selected?
    A. 49 B. 2.6 C. 33.3 D. 3.7

13. Determine the level of confidence given the confidence coefficient z(α/2) = 1.96.
    A. 97.5% B. 2.5% C. 5% D. 95%

14. A researcher tests H_0: $\mu \leq 50$ vs. H_a: $\mu > 50$. If the researcher fails to reject H_0 when μ is actually 70, how would the decision be characterized?

A. Both type I and type II errors have been made.
B. A type II error has been made.
C. A type I error has been made.
D. A correct decision has been made.

15. A hypothesis test is to be completed at the 6% level of significance. Which of the following p-values will cause rejection of the null hypothesis?

I. p-value = 0.01 II. p-value = 0.06 III. p-value = 0.6

A. I only B. II only C. I and II D. I, II and III

SECTION II (56 points)

To get full credit for Questions 16 - 23, **you must show all your work clearly** and write answers in the space provided for each problem.

16. A marketing firm has produced the following data to find out the relationship between the number of television commercial broadcasts with the sales of its product.

City	A	B	C	D	E	F	G	H	I	J
Commercials , x	6	9	12	11	15	8	15	6	12	16
Sales, Units, y	5	7	10	6	12	8	14	5	11	12

Use the following information to calculate the Correlation Coefficient (r)

$\sum x = 110$, $\sum y = 90$, $\sum x^2 = 1332$, $\sum y^2 = 904$ $\sum xy = 1087$,

Ans: _____

17. The probability of a student graduating from a college in four years is 0.4. If 7 students are selected at random, find the probability that at least 6 of them will graduate in four years. *Express answer to 4 decimals*

Ans: _____

18. A study of consumer smoking habits includes 183 people in the 18-22 age bracket (59 of whom smoke), 140 people in the 23-30 age bracket (34 of whom smoke), and 99 people in the 31-40 age bracket (22 of whom smoke). Complete the following table with the given information:

	Smoke	No Smoke
18 – 22		
23 – 30		
31 – 40		

If one person is randomly selected from this group, find the probability of getting someone who is age 18 – 22 or does not smoke.

Ans: _____

19. Consider the following set of data values:

9 16 32 41 49 59 60 67 81 82

a. Find the first quartile: a. Ans: _____

b. Find the 80th percentile: : b. Ans: _____

c. Find the midrange: : c. Ans: _____

20. The waiting time X at a fast-food restaurant during lunch time is approximately normally distributed with a mean of 4.5 minutes and a standard deviation of 1.2 minutes. Then

a. Find the probability that a randomly selected customer has to wait more than 6.8 minutes.

Ans: _____

b. Find the value of the 75th percentile (P_{75}) for X.

Ans: _____

21. Intelligence quotient (IQ) measured on the Standard Revision of the Binet-Simon Intelligence Scale is normally distributed with mean 100 and standard deviation 16. Then

a. For samples of size 25, determine the standard deviation of $\bar{x}$.

Ans: _____

b. For samples of size 25, what is the probability that the sample mean is between 100 and 105.

Ans: _____

22. A city manager claims that the average waiting time for a building permit to be processed is exactly 10 days. A random sample of 50 people who applied for building permits produced a mean waiting time of 11.8 days. Test the city manager's claim at the 10% level of significance assuming the standard deviation is known to be 4.2 days.

23. A certain adjustment to a machine will change the length of the parts it makes but will not affect the standard deviation. The length of the parts is normally distributed, and the standard deviation is 0.5 mm. After an adjustment is made, a random sample is taken to determine the mean length of the parts now being produced. The resulting lengths are as follows:

75.3 76.0 75.0 77.0 75.4 76.3 77.0 74.9 76.5 75.8

Find the 0.99 confidence interval for μ.

Ans: _____