

**Statistics Competency Assessment**  
**Sample Exam Questions**

1-4. The ages of 5 randomly selected members of a club are as follows: 42, 52, 57, 63, 51

1. The sample mean is  
(A) 21            (B) 60.5            (C) 52            (D) 53            (E) 7.78
2. The sample median is  
(A) 21            (B) 60.5            (C) 52            (D) 53            (E) 7.78
3. The sample variance is  
(A) 21            (B) 7.78            (C) 52            (D) 53            (E) 60.5
4. The sample range is  
(A) 21            (B) 60.5            (C) 52            (D) 53            (E) 7.78

5-7. The following table shows the number of credit hours registered for by 20 randomly selected students in a class.

Number of dollar bills	frequency ( $f_i$ )	mid-point ( $x_i$ )	$f_i x_i$
4 – 6	4	5	20
7 – 9	7	8	56
10 – 12	8	11	88
13 – 15	1	14	14
Total	20		178

5. The sample mean is  
(A) 4.68            (B) 8.9            (C) 9.8            (D) 17.8            (E) None of these
6. The class that contains the median is  
(A) 4 – 6            (B) 7 – 9            (C) 10 – 12            (D) 13 – 15
7. The modal class is  
(A) 4 – 6            (B) 7 – 9            (C) 10 – 12            (D) 13 – 15
8. Which of the following statements is correct?  
(A) The range is a measure of central tendency.  
(B) The median is a measure of dispersion.  
(C) For a symmetric distribution, the mean is equal to the median.  
(D) For a skewed distribution, the variance is a negative number.  
(E) The variance is a measure of central tendency.

9. After a test, John found out that she scored in the 80<sup>th</sup> percentile. This means  
 (A) John scored as high as or higher than 20% of the students who took the test.  
 (B) At least 80% of the students who took the test did better than John.  
 (C) John scored as high as or higher than 80% of the students who took the test.  
 (D) John answered 80% of the questions correctly.  
 (E) None of the above

10-12. The probability that Mary will play soccer is 0.3, the probability that Wendy will play soccer is 0.4, and they make their decisions independently.

10. The probability that both of them will play soccer is  
 (A) .28          (B) .18          (C) .1          (D) .42          (E) .12
11. The probability that Mary or Wendy or both will play soccer is  
 (A) .58          (B) .82          (C) .7          (D) .12          (E) None of these
12. The probability that both Mary and Wendy will not play soccer is  
 (A) .58          (B) .82          (C) .18          (D) .42          (E) .12

13-15. A survey classified 200 students by gender and by their opinion on a certain issue. The number falling into the different categories are shown in the following table. A student is randomly chosen from the group.

Gender	Opinion		Total
	For	Against	
Male	30	40	70
Female	50	80	130
Total	80	120	200

13. The probability that the student is female and is against the issue is  
 (A) .615          (B) .4          (C) .667          (D) .85          (E) None of these
14. The probability that the student is male or is for the issue is  
 (A) .35          (B) .40          (C) .43          (D) .6          (E) .375
15. Given that the student chosen is for the issue, the conditional probability that the student is male is  
 (A) .375          (B) .35          (C) .40          (D) .6          (E) .43
- 16-18. The following is the probability distribution of the number of phone calls received by an office between 8 am and 9 am on a day.

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

16. The probability of at least 3 phone calls is  
(A) .5 (B) .2 (C) .3 (D) .7 (E) None of these
17. The mean number of phone calls is  
(A) 3.2 (B) 3.5 (C) 11.6 (D) 1.36 (E) 1
18. The variance of the number of phone calls is  
(A) 3.2 (B) 1.17 (C) 11.6 (D) 1.36 (E) None of these
19. Suppose that 80% of all voters in a city support candidate A. Assume that 40 voters in the city are randomly selected, what is the expected number of voters that will support candidate A in such a group?  
(A) 8 (B) 20 (C) 32 (D) 30 (E) None of these
- 20-24. Suppose the scores on an examination are normally distributed with a mean of 50 and a standard deviation of 10.
20. What is the probability that the score of a student will be higher than 56.5?  
(A) .2578 (B) .7422 (C) .7578 (D) .2422 (E) .65
21. What proportion of the students scores below 45?  
(A) .1915 (B) .6915 (C) .50 (D) .3085 (E) 1
22. What is the z score that corresponds to the score 44?  
(A) .60 (B)  $-.60$  (C)  $-6.0$  (D) 6.0 (E) .85
23. What is the raw score that corresponds to  $z = 1.5$ ?  
(A) 35 (B) 15 (C) 65 (D) 50 (E) None of these
24. If repeated samples of size  $n = 25$  is taken from the scores, what is the standard deviation of the distribution of the sample mean?  
(A) 10 (B) 4 (C) 0.4 (D) 2 (E) None of these
- 25-27. In order to estimate the mean diameter of a variety of orange, a sample of 25 oranges were selected and the sample mean was found to be 7.5 cm with a sample standard deviation of 1.5 cm.
25. The point estimate of the population mean is  
(A) 1.2 (B) 25 (C) 1.44 (D) 75 (E) None of these
26. A 95% confidence interval for the population mean is  
(A) (6.91, 8.09) (B) (5.44, 9.56)(C) (6.88, 8.12)  
(D) (5.54, 9.46)
27. If a 90% confidence interval is constructed, it will be \_\_\_\_\_ the 95% confidence interval.  
(A) wider than (B) narrower than (C) the same as

- 28-31. The average annual medical expense per family in a small city was \$750 in 1998. A random sample of 49 families was selected and their expenses for 1999 had a mean of \$800 with a standard deviation of \$140. Based on this information, can we conclude at  $\alpha = 5\%$  that the average annual medical expenses had increased from the 1998 average?
28. Let  $\mu$  represent the population mean expenditure for 1999. Which of the following is the appropriate alternative hypothesis?  
 (A)  $\mu \neq 750$  (B)  $\mu = 750$  (C)  $\mu > 750$  (D)  $\mu < 750$  (E)  $\mu > 800$
29. Which of the following is the appropriate rejection region?  
 (A)  $Z < -1.96$  or  $Z > 1.96$  (B)  $Z < -1.96$  (C)  $Z < -1.645$  (D)  $Z > 1.645$   
 (E)  $-1.96 < Z < 1.96$
30. Which of the following is the value of the test statistic?  
 (A) 50 (B) -0.36 (C) 0.36 (D) -2.5 (E) 2.5
31. Which of the following is the appropriate conclusion?  
 (A) The mean medical expenses have not increased from the 1998 average.  
 (B) The mean medical expenses have increased from the 1998 average.  
 (C) A Type II error has occurred.  
 (D) A larger sample is needed in order to draw conclusions.  
 (E) The probability of a type I error is equal to .95.
- 32-35. The general partner of a limited partnership firm has told a potential investor that the mean monthly rent for a 3-bedroom home in the area is \$500. The investor wants to check out this claim on her own. She obtains the monthly rental charges for a random sample of 9 three-bedroom homes in order to test  $H_0: \mu = 500$  against  $H_a: \mu \neq 500$ , at  $\alpha = 10\%$ . The sample mean is \$520 with a sample standard deviation of \$48.
32. Which of the following is the appropriate rejection region?  
 (A)  $t > 2.306$  (B)  $-1.86 < t < 1.86$  (C)  $t > 1.833$  (D)  $t < -1.86$  or  $t > 1.86$   
 (E)  $t < -2.306$  or  $t > 2.306$
33. What is the value of the test statistic?  
 (A) 1.25 (B) -1.25 (C) .42 (D) -.42 (E) 20
34. Which of the following is the correct conclusion?  
 (A) The mean monthly rent is less than \$500.  
 (B) The mean monthly rent differs from \$500.  
 (C) The mean monthly rent is more than \$500.  
 (D) A Type II error has occurred.  
 (E) None of the above

35. In order for the above procedure to be valid, what assumption will be necessary?
- (A) The population distribution of the monthly rent is approximately normal.
  - (B) The population distribution of the monthly rent is uniform.
  - (C) The population distribution of the monthly rent is skewed.
  - (D) No assumption will be necessary.
36. A consumer advocate claims that more than 10% of the bolts from supplier A are defective. To test this claim, the correct alternative hypothesis is
- (A)  $p = .1$
  - (B)  $p \neq .1$
  - (C)  $p < .1$
  - (D)  $p > .1$
  - (E)  $p < .9$
37. A consumer claims that car model of type 1 has a lower average miles per gallon than car model of type 2. Let  $\mu_1$  and  $\mu_2$  represent the average miles per gallon for types 1 and 2 respectively. Which of the following is the correct null hypothesis?
- (A)  $\mu_1 > \mu_2$
  - (B)  $\mu_1 \geq \mu_2$
  - (C)  $\mu_1 \leq \mu_2$
  - (D)  $\mu_1 < \mu_2$
  - (E)  $\mu_1 \neq \mu_2$
38. Suppose the coefficient of correlation between the two variables x and y was found to be 0.96, we can say that
- (A) x and y have variances that are significantly different.
  - (B) x and y have means that are significantly different.
  - (C) x and y have a strong linear relationship.
  - (D) x and y do not have a strong linear relationship.
  - (E) The means of x and y are about the same.
- 39-40. Eleven cars of a certain model, between one and seven years of age, were randomly selected from the classified ads. The following summary statistics on their ages (x in years) and prices (y in 1000 dollars) were used to obtain the regression equation  $\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x = 19.8 - 1.56x$ .
39. Which of the following statements is correct?
- (A) The price will increase by \$1560 for every 1-year increase in age.
  - (B) The price will decrease by \$1560 for every 1-year decrease in age.
  - (C) The relationship between price and age is positive.
  - (D) The price for a car with 0 year of age is \$19800.
  - (E) None of the above
40. The predicted price for a 5-year-old car is
- (A) \$12000
  - (B) \$1200
  - (C) \$27000
  - (D) \$2700
  - (E) None of these

### Key to Sample Exam Questions

1	2	3	4	5	6	7	8	9	10
D	C	E	A	B	B	C	C	C	E

11	12	13	14	15	16	17	18	19	20
A	D	B	D	A	D	A	D	C	A

21	22	23	24	25	26	27	28	29	30
D	B	C	D	E	C	B	C	D	E

31	32	33	34	35	36	37	38	39	40
B	D	A	E	A	D	B	C	D	A