

**MULTIPLE CHOICE. No partial credit possible.**

- 1) A recent survey found that 70% of all adults over 50 wear glasses for driving. In a random sample of 10 adults over 50, what is the probability that at least six wear glasses?

A) 0.006                      B) 0.700                      C) 0.850                      D) 0.200

- 2) If a hypothesis test is performed with  
 $H_0: \mu = 54.4$  and  $H_1: \mu > 54.4$ ,  
how should you interpret a decision that fails to reject the null hypothesis?

A) There is not sufficient evidence to support the claim  $\mu > 54.4$ .  
B) There is not sufficient evidence to support the claim  $\mu = 54.4$ .  
C) There is sufficient evidence to support the claim  $\mu > 54.4$ .  
D) There is sufficient evidence to support the claim  $\mu = 54.4$ .

- 3) A random sample of 10 parking meters in a beach community showed the following incomes for a day. Assume the incomes are normally distributed.

\$3.60 \$4.50 \$2.80 \$6.30 \$2.60 \$5.20 \$6.75 \$4.25 \$8.00 \$3.00

Find the 95% confidence interval for the true mean.

A) (\$3.39, \$6.01)                      B) (\$2.11, \$5.34)                      C) (\$1.35, \$2.85)                      D) (\$4.81, \$6.31)

- 4) How many women must be randomly selected to estimate the mean weight of women in one age group, if we want 90% confidence that the sample mean is within 2.8 lb of the population mean, and the population standard deviation is known to be 27 lb?

A) 250                      B) 253                      C) 358                      D) 252

- 5) Find the critical values  $z_C$  that corresponds to a 94% confidence level.

A)  $\pm 1.88$                       B)  $\pm 2.33$                       C)  $\pm 1.96$                       D)  $\pm 1.645$

- 6) The average number of pounds of red meat a person consumes each year is 196 with a standard deviation of 22 pounds (Source: American Dietetic Association). If a sample of 50 individuals is randomly selected, find the probability that the mean of the sample will be less than 200 pounds.

A) 0.8815                      B) 0.7613                      C) 0.9007                      D) 0.5721

- 7) Each manager of a corporation was rated as being either a good, fair, or poor manager by his/her boss. The manager's educational background was also noted. The data appear below:

Educational Background

Manager Rating	H. S. Degree	Some College	College Degree	Master's or Ph.D.	Totals
Good	8	2	24	5	39
Fair	1	13	48	25	87
Poor	3	7	6	18	34
Totals	12	22	78	48	160

Given that a manager is rated as fair, what is the probability that this manager has no college background?

- A)  $\frac{1}{12}$                       B)  $\frac{1}{87}$                       C)  $\frac{49}{80}$                       D)  $\frac{1}{160}$

- 8) The scores on a mathematics exam have a mean of 70 and a standard deviation of 5. Find the exam score that corresponds to the z-value 2.33.

- A) 72.3                      B) 75.0                      C) 81.7                      D) 58.4

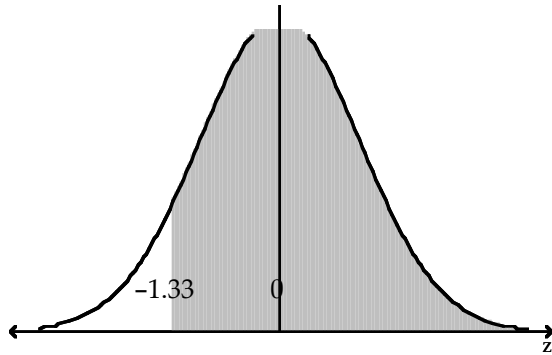
- 9) A large national bank charges local companies for using their services. A bank official reported the results of a regression analysis designed to predict the bank's charges ( $y$ ), measured in dollars per month, for services rendered to local companies. One independent variable used to predict service charge to a company is the company's sales revenue ( $x$ ), measured in \$ million. Data for 21 companies who use the bank's services were used to fit the model

$$E(y) = \beta_0 + \beta_1 x.$$

Suppose a 95% confidence interval for  $\beta_1$  is (15, 25). Interpret the interval.

- A) We are 95% confident that sales revenue ( $x$ ) will increase between \$15 and \$25 million for every \$1 increase in service charge ( $y$ ).  
 B) We are 95% confident that service charge ( $y$ ) will increase between \$15 and \$25 for every \$1 million increase in sales revenue ( $x$ ).  
 C) We are 95% confident that the mean service charge will fall between \$15 and \$25 per month.  
 D) We are 95% confident that the value of the service charge ( $y$ ) will fall between \$15 and \$25 per month.
- 10) Suppose the scores for a MATH 2510 final exam in one section of 30 students had a mean of 77.3 and a standard deviation of 7.2. If 5 more students take the exam and all 5 students score in the 60–65 range, how will this affect the mean and the standard deviation of the exam?
- A) The mean will decrease and the standard deviation will increase.  
 B) The mean will decrease and the standard deviation will decrease.  
 C) The mean will increase and the standard deviation will increase.  
 D) The mean will increase and the standard deviation will decrease.

11) Find the area of the shaded region under the standard normal curve.



A) 0.9668

B) 0.9332

C) 0.9180

D) 0.9082

12) Many track runners believe that they have a better chance of winning if they start in the inside lane that is closest to the field. For the data below, the lane closest to the field is Lane 1, the next lane is Lane 2, and so on until the outermost lane, Lane 6. The data lists the number of wins for track runners in the different starting positions. Calculate the chi-square test statistic  $\chi^2$  to test the claim that the number of wins is uniformly distributed across the different starting positions. The results are based on 240 wins.

Starting Position	1	2	3	4	5	6
Number of Wins	45	36	33	50	32	44

A) 15.541

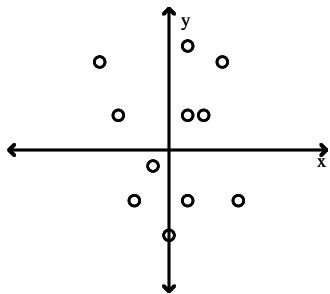
B) 6.750

C) 9.326

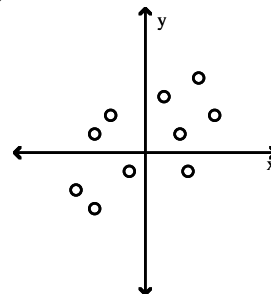
D) 12.592

13) Determine which plot shows the strongest linear correlation.

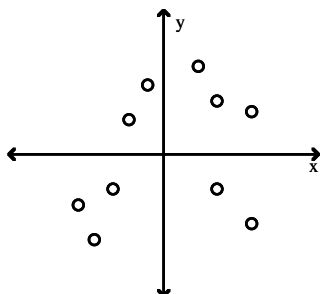
A)



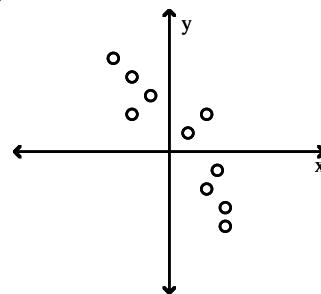
B)



C)



D)



14) Which level of measurement is most appropriate to describe the numbers on the shirts of a girl's soccer team

A) ratio

B) ordinal

C) nominal

D) interval

**SHORT ANSWER.** To receive full credit both the correct answer and complete and correct work must be shown leading to that answer. If you are using a calculator function, make sure to state the function and both the input and output for that function as your work.

- 15) A women's advocacy group claims that women golfers receive significantly less prize money than their male counterparts when they win first place in a professional tournament. The data listed below are the first place prize monies from male and female tournament winners. Assume the samples are random, independent, and come from populations that are normally distributed. At  $\alpha = 0.01$ , test the group's claim.

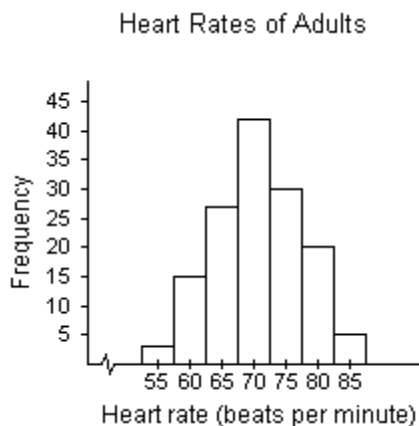
Female Golfers

180,000 150,000 240,000 195,000 202,500  
120,000 165,000 225,000 150,000 315,000

Male Golfers

864,000 810,000 900,000 810,000 630,000  
1,050,000 945,000 630,000 900,000 756,000

- 16) The histogram displays the heart rates of adults in a gym.



- a.) Describe the shape of the distribution.
- b.) Estimate the mean, median, and mode of the data.

- 17) The data below are the average monthly temperatures, in °F, and the monthly natural gas consumption, in ccf, for a household in northwestern Pennsylvania.

Temperature	47	35	21	27	39	48	61	65	70
Consumption	34	169	248	134	137	100	19	34	12

a.) Test the claim that population correlation coefficient  $\rho \neq 0$ . Use  $\alpha = 0.05$ . (Make sure to include the statements of the null and alternate hypotheses, the relevant P-value, and the interpretation of the result of the test.)

b.) Determine the least squares line of best fit for this data.

- 18) A medical researcher wishes to try three different techniques to lower blood pressure of patients with high blood pressure. The subjects are randomly selected and assigned to one of three groups. Group 1 is given medication, Group 2 is given an exercise program, and Group 3 is assigned a diet program. At the end of six weeks, each subject's blood pressure is recorded. Test the claim that there is no difference among the means. Use  $\alpha = 0.05$ . (Make sure to include the statements of the null and alternate hypotheses, the relevant P-value, and the interpretation of the result of the test.)

Group 1	Group 2	Group 3
13	8	6
12	2	12
9	3	4
15	5	4
11	4	9
8	0	8

# Answer Key

Testname: 2510 MINI-FINAL F15

- 1) C
- 2) A
- 3) A
- 4) D
- 5) A
- 6) C
- 7) B
- 8) C
- 9) B
- 10) A
- 11) D
- 12) B
- 13) D
- 14) C

15)  $H_0: \mu_1 = \mu_2$  (OR  $H_0: \mu_1 - \mu_2 = 0$ )

$H_1: \mu_1 < \mu_2$  (OR  $H_1: \mu_1 - \mu_2 < 0$ )

Standardized test statistic  $t \approx -13.935$ ; P-value  $P \approx 0.000000004$ ;

Reject  $H_0$ ; There is sufficient evidence to support the claim that women receive less prize money.

16) a.) The distribution is uni-modal and symmetric.

b.) The histogram appears to approximately convey the following frequency table.

Heart Rate	Frequency
53 - 57	4
58 - 62	15
63 - 67	27
68 - 72	43
73 - 77	30
78 - 82	20
83 - 87	5

Using the midpoint of each interval: The mean  $\approx 70.6$ . The median = 70. The mode = 70.

17) a.)  $H_0: \rho = 0$  &  $H_1: \rho \neq 0$ ;

Standardized test statistic  $t \approx -5.7837$ ; P-value = 0.0006747;

Reject  $H_0$ ; There is sufficient evidence to conclude that a significant correlation exists.

b.)  $\hat{y} \approx 296.352 - 4.310x$

18)  $H_0: \mu_1 = \mu_2 = \mu_3$

$H_1$ : At least one mean is different from the others.

Test statistic  $F \approx 11.095$ ; P-value  $P \approx 0.0011$ .

Reject  $H_0$ ; There is enough evidence at the 5% level of significance to reject the claim that the mean blood pressures are equal for all groups.