

Problem Set 6

Name: _____ Date: _____

20 Questions: Each is worth 5 points.

Use the following to answer questions 1-2:

A sociologist wants to determine if the life expectancy of people in Africa is less than the life expectancy of people in Asia. The data obtained is shown in the table below.

	Africa	Asia
\bar{X}	55.3	65.2
σ	8.1	9.3
n	53	42

1. What is the null hypothesis? Use $\alpha = 0.05$.

- A) $H_0: \mu_1 \leq \mu_2$ B) $H_0: \mu_1 = \mu_2$ C) $H_0: \mu_1 \geq \mu_2$ D) $H_0: \mu_1 \neq \mu_2$

2. Calculate the critical value. Use $\alpha = 0.05$.

- A) -2.33 B) -2.58 C) -1.96 D) -1.65

3. A marketing firm asked a random set of married and single men as to how much they were willing to spend for a vacation. At $\alpha = .05$, is a difference in the two amounts?

	Married men	Single men
Sample size	50	70
Mean spending	260	185
Sample variance	4500	9000

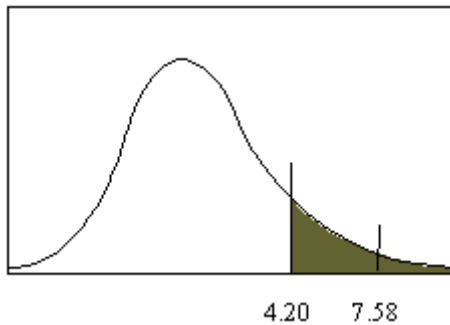
- A) Yes, because the test value 5.07 is outside the interval (-1.96, 1.96)
 B) No, because the test value 2.00 is outside the interval (-1.96, 1.96)
 C) No, because the test value 0.34 is inside the interval (-1.96, 1.96)
 D) Yes, because the test value 2.00 is inside the interval (-1.96, 1.96)

4. For the samples summarized below, test the hypothesis at $\alpha = .05$ that the two variances are equal.

	Variance	Number of data values
Sample 1	19	8
Sample 2	9	18

- A) Reject the hypothesis because the test value 2.11 is less than the critical value 3.16.
B) Reject the hypothesis because the test value 4.46 is greater than the critical value 3.01.
C) Accept the hypothesis because the test value 2.11 is less than the critical value 3.16.
D) Reject the hypothesis because the test value 4.46 is greater than the critical value 3.01.
5. A medical researcher is interested in whether patients' left arms or right arms are longer. If 14 patients participate in this study (so that n left arms and n right arms are measured), how many degrees of freedom should the researcher use in her t-test critical value?
- A) 26 B) 27 C) 14 D) 13
6. Many elementary school students in a school district currently have ear infections. A random sample of children in two different schools found that 16 of 42 at one school and 21 of 36 at the other had this infection. At the .05 level of significance, is there sufficient evidence to conclude that a difference exists between the proportion of students who have ear infections at one school and the other?
- A) No, there is not sufficient information to reject the hypothesis that the proportions of students at the two schools who have ear infections are the same because the test value -1.78 is inside the acceptance region $(-1.96, 1.96)$.
B) Yes, there is sufficient information to reject the hypothesis that the proportions of students at the two schools who have ear infections are the same because the test value -2.34 is outside the acceptance region $(-1.96, 1.96)$.
C) Yes, there is sufficient information to reject the hypothesis that the proportions of students at the two schools who have ear infections are the same because the test value -8.76 is outside the acceptance region $(-1.96, 1.96)$.
D) Yes, there is sufficient information to reject the hypothesis that the proportions of students at the two schools who have ear infections are the same because the test value -15.73 is outside the acceptance region $(-1.96, 1.96)$.

7. Determine the value of α as shown in the figure below, if the degrees of freedom were seven and nine.



- A) 0.1 B) 0.01 C) 0.025 D) 0.05

8. A pharmaceutical company is testing the effectiveness of a new drug for lowering cholesterol. As part of this trial, they wish to determine whether there is a difference between the effectiveness for women and for men. At $\alpha = .05$, what is the test value?

	Women	Men
Sample size	40	70
Mean effect	7	6.75
Sample variance	2.5	4.5

- A) 0.70 B) 1.97 C) 0.36 D) 1.42

Use the following to answer question 9:

A researcher wanted to determine if using an octane booster would increase gasoline mileage. A random sample of seven cars was selected; the cars were driven for two weeks without the booster and two weeks with the booster.

Miles / Gal Without	Miles / Gal With
21.2	23.8
25.4	25.6
20.9	22.4
27.6	28.3
22.8	24.5
27.3	28.8
23.4	25.2

9. State the alternative hypothesis?

- A) $H_1: \mu_D \neq 0$ B) $H_1: \mu_D < 0$ C) $H_1: \mu_D = 0$ D) $H_1: \mu_D > 0$

10. In comparing the two variances below, what is the test value and what are the degrees of freedom that should be used?

	Variance	Number of values
Sample 1	6	18
Sample 2	11	29

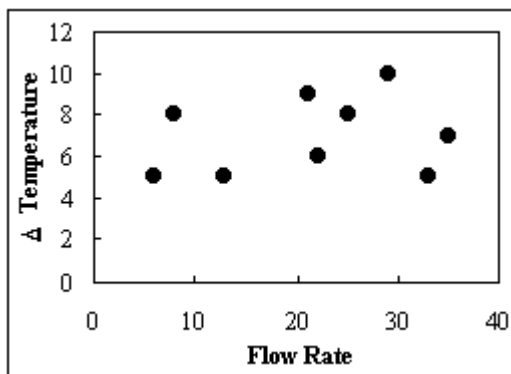
- A) test value = 1.83, degrees of freedom = 18 and 29
B) test value = 1.83, degrees of freedom = 17 and 28
C) test value = 0.55, degrees of freedom = 18 and 29
D) test value = 0.55, degrees of freedom = 17 and 28
11. A study of cats and dogs found that 11 of 50 cats and 21 of 50 dogs slept more than 10 hours per day. At the .05 level of significance, is there sufficient evidence to conclude that a difference exists between the proportion of cats and the proportion of dogs that sleep more than 10 hours per day?
- A) No, there is not sufficient information to reject the hypothesis that the proportion of cats and the proportion of dogs that sleep more than 10 hours per day are the same because the test value -0.65 is inside the acceptance region $(-1.96, 1.96)$.
B) Yes, there is sufficient information to reject the hypothesis that the proportion of cats and the proportion of dogs that sleep more than 10 hours per day are the same because the test value -2.14 is outside the acceptance region $(-1.96, 1.96)$.
C) No, there is not sufficient information to reject the hypothesis that the proportion of cats and the proportion of dogs that sleep more than 10 hours per day are the same because the test value -1.40 is inside the acceptance region $(-1.96, 1.96)$.
D) Yes, there is sufficient information to reject the hypothesis that the proportion of cats and the proportion of dogs that sleep more than 10 hours per day are the same because the test value -2.47 is outside the acceptance region $(-1.96, 1.96)$.

12. A study was conducted to determine if there was a relationship between the prices a non-member of a club paid for various publications and the prices that a member paid for the same publications. The data collected is shown below.

Non-member Price, x	Member Price, y
58	32
42	22
46	20
32	16
25	19
75	58
35	34
63	48

Find the value of $\sum x^2$

- A) 93,624 B) 19,712 C) 9349 D) 13,251
13. The possible relationship between pairs of data values could be examined from a
- A) Histogram
 B) Scatter plot
 C) Pareto graph
 D) Pie chart
14. Daniel Wiseman, a scientist for Gres-Trans Corp., wants to determine if the flow rate of a particular material changes with different changes in temperature. The data is plotted in the figure below. What type of relationship exists between the flow rate and the change in temperature?



- A) There is no relationship. B) curvilinear C) positive D) negative

15. Compute the slope of the regression line for the data below.

X values	-3	0	3	5	10
Y values	7	4	-2	2	-3

- A) -4.13 B) -0.72 C) -1.70 D) 1.20

16. If the equation for the regression line is $y = -4x + 7$, then the slope of this line is

- A) -4 B) 3 C) 14 D) 7

17. Compute the correlation coefficient for the data below

X values	-4	-1	1	3	4
Y values	3	-1	-2	3	1

- A) 0.202 B) 0.013 C) 0.286 D) -0.082

18. The equation of a regression line is $y' = 4.6 + 32x$. What is the intercept of this line?

- A) 4.6 B) -4.6 C) 0 D) 3.2

19. Compute the correlation coefficient for the data below

X values	-2	-1	0	3
Y values	4	2	8	1

- A) -0.233 B) 0.000 C) -0.349 D) -57.500

20. In a regression model $y' = -10 + 2x$, if the value of x changes by -3, then the actual value of y will have

- A) decrease by 30 B) increase by 3 C) decrease by 6 D) cannot be determined