TA’S NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Problem Set #6**

1. Report the critical values of *F* for the following:
   1. =0.05, 2 groups, 20 subjects
   2. =0.05, 4 groups, 30 subjects
   3. =0.01, 4 groups, 30 subjects
   4. =0.01, 10 groups, 100 subjects
   5. =0.05, 9 groups, 1,000 subjects
2. How many times have Chevy, Ford, and Dodge truck drivers had their trucks break down? From within each of the *j*=3 groups, I randomly sampled 3 drivers. The resulting responses were:

Among CHEVY Drivers: 1, 1, 3

Among FORD Drivers: 0, 1, 4

Among DODGE Drivers: 1, 2, 5

SSBetween = 2

SSWithin = 20

Conduct—by hand—an analysis of variance to determine whether there is a statistically significance association between Y=”how many times drivers’ trucks have broken down” and X=”the make of the truck.” (*For this example, relax the assumptions about the normality and homoskedasticity assumptions*). Use =0.05. Be sure to (a) State the hypotheses; (b) State the critical value; (c) Calculate and report the appropriate test statistic; and (4) State your conclusions based on a comparison of the test statistic to the critical value. *Show your work.*

1. Do college students’ grade point averages vary by how many hours per week they work at paid jobs? To find out, I randomly selected four students who do not hold paid jobs during the academic year, four students who work at part-time jobs during the school year, and four students who work at full-time jobs during the school year. I collected information about all 12 students’ grade point averages. Here is what I observed:

*No Paid Jobs*:

Student #1: 3.6 Student #2: 3.1 Student #3: 3.3 Student #4: 3.2

*Part-Time Jobs*:

Student #1: 3.3 Student #2: 3.4 Student #3: 3.0 Student #4: 3.1

*Full-Time Jobs*:

Student #1: 3.5 Student #2: 2.8 Student #3: 3.1 Student #4: 3.0

SSBetween = 0.08

SSWithin = 0.50

Test the hypothesis that the population mean GPA is the same across groups of students defined by whether they work full-time, part-time, or not at all at paid jobs during the school year. (*For this example, relax the assumptions about the normality and homoskedasticity assumptions*). Use =0.05. Be sure to (a) State the hypotheses; (b) State the critical value; (c) Calculate and report the appropriate test statistic; and (4) State your conclusions based on a comparison of the test statistic to the critical value. *Show your work.*

1. Report the critical values of 2 for the following tables with *i* rows and *j* columns:
   1. =0.05, *i*=2 and *j*=4
   2. =0.05, *i*=3 and *j*=6
   3. =0.01, *i*=3 and *j*=2
   4. =0.01, *i*=5 and *j*=9
   5. =0.05, *i*=10 and *j*=3
2. A group of researchers is interested in understanding how television viewing among children is related to their grades in school. They interviewed 200 randomly selected children and asked them how many hours of television they typically watch per day. They then found out from the children’s parents what their grades are in school. Here are their results:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **GRADES** | | |  |
|  |  | Mostly  A’s & B’s | Mostly  C’s | Mostly  D’s or F’s | *Total* |
| **HOURS OF TELE-VISION WATCHED PER DAY** | None | 60 | 13 | 7 | 80 |
|  |  |  |  |
| <2 Hours | 45 | 37 | 8 | 90 |
|  |  |  |  |
| >2 Hours | 15 | 10 | 5 | 30 |
|  |  |  |  |
|  |  |  |  |  |  |
|  | *Total* | 120 | 60 | 20 | 200 |

Is there a statistically significant association between students’ grades and the number of hours of television per day that they watch? Use  significance level of 0.05.

* 1. State the null and alternative hypotheses
  2. Do these sample data conform to the basic assumptions that must hold in order to make valid inferences using this procedure?
  3. Determine the “critical value” … that is, how large the test statistic must be in order to reject the null hypothesis at the given  level
  4. Compute the appropriate test statistic. *Show your work.*
  5. Compare the test statistic to the critical value. What do you conclude? Do you reject the null hypothesis? In plain terms, explain what your statistical conclusion says about whether there is a significant association between students’ grades and the number of hours of television per day that they watch.

1. Based on the sample data described in the crosstable below, is there a statistically significant association between X and Y in the population from which these data were randomly selected?

Y=1 Y=2

X=1 10 5

X=2 7 5

X=3 5 10

Conduct—by hand—a 2 analyses to determine whether there is a statistically significance association between X and Y. Use =0.05. Be sure to (a) State the hypotheses; (b) State the critical value; and (c) State your conclusions based on a comparison of the test statistic to the critical value. *Show your work.*

1. Below is a table relating the dichotomous variable “Happy or Sad” to the dichotomous variable “In Love or Not.” Describe the strength and direction of the association between these two variables using **(a)** Relative Risk and **(b)** the Odds Ratio (each of which you should compute by hand). For the latter measures, consider “In Love or Not” to be the dependent variable. Be sure to interpret each value. **SHOW YOUR WORK**

**Happy or Sad?**

*Sad Happy*

**In Love or** *In Love* 11 18

**Not?** *Not in Love* 21 14