

## CS130 Practice Problems for the Final

Skills you will need:

Connect to Turing

Import data from the Web in Excel

Import Excel data into SPSS

Edit/cleanup data in Excel to prepare it for SPSS

Work through as many of the following problems as possible and save the results in a Word document. Some problems specify Excel or SPSS. If neither is specified you may choose.

Remember, the key to SPSS is determining how to layout the data.

### Problem #1:

For a random number of selected homes sold in Washington County, the annual tax amount (in thousands of dollars) and selling price (in thousands of dollars) are as follows.

Taxes: 4.0 2.4 1.8 1.5 1.4 1.4 3.0 1.9

Selling

Price: 265 142 114 160 130 150 228 145

What constitutes a single case or item? Remember, this will be represented by a row. \_\_\_\_\_

What are the variables? Remember, this will be represented by columns. \_\_\_\_\_

Perform a Linear Regression on the above data using Excel and paste your results to a Word document. What is the independent variable? \_\_\_\_\_ What is the dependent variable? \_\_\_\_\_

Perform a Linear Regression on the above data using SPSS and paste your results to a Word document.

Using the equation editor, show the linear equation and R-squared value produced by performing the Linear Regression in SPSS.

For an annual tax amount of \$3,400, what might we expect the selling price of this house to be?

For a selling price of \$335,000, what might we expect the taxes to be for this house?

**Problem #2:**

You have been hired at a water treatment plant to manage the water quality of the treated water. A new set of filters are installed and you want to determine if they were worth the money. You measure the bacteria count in treated water before and after the new filters are installed. The data you collected is shown below, two samples for each of the 11 clean water tanks. Did the new filter reduce the amount of bacteria in the clean water tanks?

Tank #	1	2	3	4	5	6	7	8	9	10	11
Old Filter	10	15	1	3	10	2	18	16	8	5	1
New Filter	4	10	2	1	7	1	3	5	2	3	2

What constitutes a single case or item? Remember, this will be represented by a row. \_\_\_\_\_

What are the variables? Remember, this will be represented by columns. \_\_\_\_\_

**Problem #3:**

Consider the following two cold medicines tested for acetaminophen.

Test the claim that the mean amount of acetaminophen is the same for both medicines. What is your conclusion?

Brand A	472	487	506	512	489	503	511	501	495	504	494	462
Brand B	562	512	523	528	554	513	516	510	524	510	524	508

What constitutes a single case or item? Remember, this will be represented by a row. \_\_\_\_\_

What are the variables? Remember, this will be represented by columns. \_\_\_\_\_

Explain what Hypothesis test you will be using to solve the problem.

State the Null Hypothesis.

Perform the proper Hypothesis test and paste in the results.

State your conclusion and reasoning for your conclusion.

**Problem #4:**

It is often the case that bacterial cultures, confined to a petri dish, will grow quite rapidly until the amount of bacteria approaches a critical value. Given the formula for bacteria growth as  $P(t) = 7.74e^{0.143t}$  where  $P(t)$  is the amount of bacteria present at time  $t$  hours later. Create an Excel worksheet that allows the user to **input** a time and that reports the amount of bacteria present at that particular time. Create a comment (right click on a cell and choose Insert Comment) that shows the number of bacteria that can be expected at time  $t=1000$ . The comment is to be placed and displayed in cell A5. Next, in a separate workbook, create a table listing the size of the population at  $t=0, t=5, t=10, \dots$  through  $t=250$  (increase  $t$  by 5 each time). Finally, take the table data into SPSS and create an appropriate graph showing the results. Make sure the graph is completely and properly labeled.

**Problem #5:**

The NCAA is considering ways of speeding up the end of college basketball games. In a recent NCAA tournament, the last two minutes of 60 games took the following times to complete (in seconds):

756	587	929	871	378	503	564	1128	693	748
448	670	1023	335	540	853	852	495	666	474
443	325	514	404	820	915	793	778	627	483
861	337	292	1070	625	457	676	494	420	862
991	615	609	723	794	447	704	396	235	552
626	688	506	700	240	363	860	670	396	345

Note: Data was reported in USA Today

- In both Excel and SPSS, find the mean, median, mode, standard deviation, minimum, and maximum values for the given data. Paste these results into a Word document.
- Create a histogram of the given data.
- Do these times indicate that something should be done to speed up the last two minutes of the game (is the last two minutes too long)? Support your answer as best you can.

**Problem #6:**

You have been offered a 5 year loan on a \$10,000 car with an 8.7% annual interest rate. What will your monthly payment be?

You can afford a \$300 monthly payment. How does that affect the price of the car you can purchase using this same 5 year loan with an 8.7% interest rate?

**Problem #7: Excel**

Every month your parents probably receive a mortgage statement that shows their loan balance and some specifics about the loan like the monthly payment and monthly interest rate. They are not quite sure how many months they have left before the loan is paid off. You can develop a table that shows them the exact month that their loan is paid off. The ending balance might be a few cents (not exactly zero) but it should only be pennies off. Create an amortization table using the following information:

Loan Balance: 147,964.65  
Monthly Payment: 1,580.17  
Interest Rate: 6.5%

Do you have any way to check your results?

### **Problem #8: Excel**

Create a new Excel Spreadsheet, name this worksheet **Box**. Most delivery companies charge a different price for different size boxes. ForestGroveShipping charges \$10.00 to deliver a small box and \$20.00 to deliver a large box. To determine if your box is small you need to add the length, width, and height of your box. If this total is less than 90 inches, the box is small. If it is 90 inches or more, the box is considered to be large.

You need to build a worksheet that will allow the user to input the length, width, and height of a box and have the cost to ship that box displayed in cell A4. Be sure to clearly label the input cells and the output cell. The output cell should either display \$10.00 or \$20.00. If the output is \$10.00, have cell A4 displayed in green. If the output is \$20.00, have cell A4 displayed in red.

### **Problem #9 – Challenge Question**

Download the Excel workbook from this URL:

<http://www.dot.gov/office-policy/aviation-policy/table-1-domestic-airline-airfare-report-first-quarter-2013>

This worksheet contains data about Airline Airfares.

How well does **Overall Average Fare** predict **Avg. Fare Lowest Car.**?

Add a column that calculates the difference between the Overall Average Fare and the Ave Fare Lowest Car. Add a column that displays either POSITIVE, NEGATIVE, or NEITHER depending on if the difference is positive, negative, or neither.

Add a column that calculates the difference between the Overall Average Fare and the Ave Fare Lowest Car, as a percentage of the Overall Average Fare.

How often is the largest carrier and the low fare carrier the same?

Does the largest and low fare carrier being the same have a statistically significant effect on the difference between the Overall Average Fare and the Ave Fare Lowest Car.?

Does the largest and low fare carrier being the same have a statistically significant effect on the percentage difference between the Overall Average Fare and the Ave Fare Lowest Car.?