# **CS 160 LAB 6**

# Chapter 2 Algorithm Discovery and Design

1. Chapter 2 of our textbook describes three broad categories of language: natural languages, computer programming languages, and pseudocode.
   1. Name a natural language you are familiar with. Why should it be considered a natural language?

-I'm familiar with the Spanish language because it is a language that I use to speak and write most of my time.

* 1. By now you should have some familiarity with the computer programming language Python (or whichever language your instructor is using with this course). Do you consider Python to be suitable for communication with your family and friends? Why or why not?

-No, because python like other computer languages is hard to follow also has a lack of flowing.

* 1. Which category of the three categories listed above is most suitable for communicating instructions to a computer? Why?

-The most suitable way for communicating with a computer is algorithms because the computer is good following orders.

* 1. In what situations would pseudocode be the most appropriate language to use? Why?
  2. What problem(s) do you foresee if using a natural language to express algorithms?

1. Using only the sequential operations described in Section 2.2.2, write an algorithm that gets two values: the price for item A and the quantity purchased. The algorithm should then print the total cost and the total cost plus an 8% sales tax.

-Step 1: Get values for the price of item “Price” and Quantity of item

-Step 2: Multiply the value of “Price” and “Quantity” of item

-Step 3: Multiply the value of “cost” with “0.08” and then assign to “TaxRate.”

Step 4: Add the value of “cost” and “TaxRate” and then assign to “Totalcost”

Step 5: Print the value of “TotalCost”

1. Using only the sequential operations described in Section 2.2.2 , write an algorithm that gets four numbers corresponding to scores received on three semester tests and a final examination. Your algorithm should compute and display the average of all four tests, weighting the final exam twice as heavily as a regular test.

-Step 1: Get values for the first semester “N1”, second semester “N2”, third semester “N3”, and final exam “FE”.

-Step 2: Calculate the value of (N1 + N2 + N3 + 2FE) / 5 and then assign to “Average”.

-Step 3: Display the value of “Average”

1. Section 2.2.3 of our textbook introduces another way to express algorithms or portions of algorithms: By using a visual representation known as a “flow chart”. Do you think flow charts are most similar to natural languages, pseudocode, or computer programming languages? Why?
2. Write pseudocode using an if/then/else structure to do each of the following operations:
3. Compute and display the value x ÷ y if the value of y is not 0. If y does have the value 0, then display the message ‘Unable to perform the division’.

-Step 1: Get values for “x” and “y”.

-Step 2: if y ≠ 0, then

-Step 3: Display the value of (x / y)

-Step 4: Else

-Step 5: Display the statement “Unable to perform the division”.

1. Compute the area and circumference of a circle given the radius r if the radius is greater than or equal to 1.0; otherwise compute only the circumference.

-Step 1: Get the value for radius “r".

-Step 2: if r >= 1.0 then

-Step 3: Calculate the value of π \* r^2 and then assign to “Area”.

-Step 4: Calculate the value of 2 \* π \* r and then assign to “Circumference”

-Step 5: Else

-Step 4: Calculate the value of 2 \* π \* r and then assign to “Circumference”

1. Suppose you have an algorithm for washing a dinner plate. The algorithm consists of:
   1. Push the plate into soapy water
   2. Wipe the plate thoroughly with a non-abrasive pad
   3. Rinse the plate
   4. Place the plate in the drain rack

You plan to add a loop to the algorithm so that it will properly handle any number of plates. Would you use a pre-test loop or a post-test loop? Why?

1. Below is a simple while loop written in pseudocode. (In this pseudocode, the body of the loop is denoted by indentation.)

|  |
| --- |
| Set J to 1  While ( J is less than or equal to 10 )  Print J  Add 1 to J  Print J |

* 1. What term does our textbook use for the expression shown in parentheses above?

-Continuation Condition

* 1. What value is printed by the final Print instruction?

-Is printed the final value of J.

* 1. What would happen if the Add instruction is omitted?

-There would be an error.

* 1. What is the term for the kind of loop that is created when the Add instruction is omitted?
  2. Modify the code above so that the loop will print the odd integers in the range 3 through 7. What will be printed by the final Print J instruction?

1. Develop an algorithm to compute gross pay. The inputs to your algorithm are the hours worked per week and the hourly pay rate. The rule for determining gross pay is to pay the regular pay rate for all hours worked up to 40, time-and-a-half for all hours over 40 up to 54, and double time for all hours over 54. Compute and display the value for gross pay using this rule. After displaying each value, ask the user whether he or she wants to do another computation. Repeat the entire set of operations until the user says no.

Step1 : Read numberOfHours and hourPay from the user

Step2: check if numberOfHours <40 than return numberOfHours \* hourPay;

Step 3: else check if numberOfHours <54

if yes

amount = 40 \* hourPay;

store the newHour rate in temp

temp = hourPay \*1.5;

now find amount for remaining time with new hourPay

amount = amount+(numberOfHours-40) \* hourPay;

Step 4: check if numberOfHours>54

if yes

amount = 40 \* hourPay;

store the newHour rate in temp

temp = hourPay \*1.5;

now find amount for remaining time with new hourPay

amount = amount+(numberOfHours-40) \* hourPay;

temp = hourPay \*2;

now find amount for remaining time with new hourPay

amount = amount+(numberOfHours-54) \* hourPay;

Step 5: return the amount

Step 6: ask user if he want to calculate one more time, if yes repeate step 1