

CSC101-0901 Spring 2020

Laboratories

Last Updated May 1

Show me your work during the lab parts of our on-line sessions if you have such an opportunity.

Email me your work that you could not show during the lab time.

When emailing follow the homework submission requirements.

Lab 1. Arithmetics

- a) Convert 10100101_2 to decimal.
- b) Convert 58_{10} to binary.
- c) Convert 66_{10} to hexadecimal
- d) Convert $AC9_{16}$ to decimal.
- e) $11001111+10101110=$
- f) $8FA9+ F7D3=$
- g) convert $3A5D_{16}$ to binary.
- h) convert 11001010_2 to hexadecimal.

Lab 2. Calculations

Write a program that evaluates the following expressions. Don't do any calculations manually. Tell the user what are you computing and the result. Your results have to be as exact as possible.

Assign a value to the a variable by yourself. Ask the user of the program for the value for b.

- a) $7*(-3)+\sqrt{8}$
- b) $\frac{5-a}{4+3}+12$
- c) $\frac{3*(\sqrt{5+b+2})}{a^{3+b}}$
- d) Program an example that demonstrates the difference between the integer and floating-point division.
- e) Write a program that asks a user how many classes he or she is taking. Given that the price of a class is \$99999.98 and the education tax is 247%, tell the user how much he or she has to pay.

Lab 3. Drawing

Use several of the turtle functions to draw something of your choice.

Lab 4. Boolean Expressions

Write a program that evaluates the following expressions. Assign reasonable values to the variables. Print the results.

- a) $a < b \geq c$
- b) $\frac{\sqrt{a-7}}{b^2} \neq c$
- c) $d \vee e \wedge f$
- d) $a < b \vee \neg d$

\wedge means *and*,

\vee means *inclusive or*,

¬ means *not*.

Lab 5. If

- a) Ask a user how many kilograms of brains does he have. If he has more than 1.4, tell him that he is like a smart person, otherwise tell him that he is unlike a smart person.
- b) Ask a user for 2 integers and divide them. Prevent the division by zero exception. Display the result.
- c) Use `elif` structure in the following: Ask a user for his or her income.
If the income is between \$0 and \$20000, make the user pay \$9000000 tax.
If the income is between \$20001 and \$90000 make the user pay 70%.
If the income is between \$90001 and \$900000 make the user pay 30%.
If the income is above \$900000 make the user pay 1%.
Tell the user the sum he or she has to pay and how much money he or she has left.
- d) Draw flowcharts for the previous parts of this lab.

Lab 6. Loops

- a) Write a for loop that prints all integers from 3 to 13 inclusive. Write a version of it with a list and range.
- b) Write a for loop that prints 5 elements of the following sequence: $\frac{2}{3}, \dots, \frac{n^2+1}{3n}$
- c) Write a loop that computes the sum of all the integers from 8 to 78 inclusive.
- d) Write a loop that asks a user to enter the mass of the sun. Keep asking as long as the user provides a wrong answer. (Use a normal unit for mass.)
- e) Write nested loops that print the following:
%
%%
%%%
%%%%
f) Draw flowcharts for parts b, c and e.

Lab 7. Functions

- a) Write a program that asks a user for the minimum and the maximum and prints a random number from the minimum to the maximum.
- b) Write a function that accepts no arguments, returns nothing and prints "I am beginning to learn functions".
- c) Write a function that accepts a distance and a speed as arguments and returns how long it would take to travel the distance with the given speed. (Use normal units.)
- d) Write a function that accepts a velocity of an object and its mass as arguments and returns the kinetic energy of the object. ($E_k = \frac{1}{2}mv^2$).
- e) Write a main function that asks a user whether he wants to compute the time or the kinetic energy asks him for the appropriate values and prints the result. (Note that the whole point here is to take advantage of the functions you wrote above.)

Lab 8. HTML

Create an HTML file, open it in a simple text editor (e.g. notepad) and a web browser (e.g.

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Firefox) At the same time. (You can drag and drop it into both applications.)

Write a web page containing elements we covered in class. To view the changes you are making, save the HTML file in the text editor and refresh (typically using a button with a round arrow) it in your browser.