

Honors Computer Science Python

Mr. Clausen

Program 3A, 3B, 3C, 3D

Program 3A “Three For Time” (20 points)

Write a program to practice “for loops”. Ask the user to enter values for the lower case lower limit, lower case upper limit, upper case lower limit, upper case upper limit, and number upper limit. Make your program user friendly by prompting them for this value. Use one line comments to separate this program into its parts: input, and “calculations and output” which will be merged into one section.

- 1) Use a `DocString` at the beginning of the program for your comments.
- 2) Import `math`.
- 3) Initialize all of the variables that are to be used in this program.
- 4) Use `print` statements to display your name and period output just like those used for program 1A.
- 5) Ask the user for the values of the lower case lower limit, lower case upper limit, upper case lower limit, upper case upper limit, and number upper limit.
- 6) Perform all of the calculations. First, print out the capital letters of the alphabet from “A to Z” using their ASCII code values (65-90) in the loop and converting them to characters. Second, print the lower case letters of the alphabet BACKWARDS from “z to a” using their ASCII code values (122-97) in the loop and converting them to characters. Third, use a for loop to print out the numbers from 1 to the number upper limit, their squares, cubes, square roots, and cube roots. Use format strings to display these titles first, then use format strings to display the numbers to align to the titles. Display square roots, and cube roots to 4 decimal places. Separate the results of the three “for loops” with blank lines.
- 7) Make sure that you use descriptive identifiers for all of your variables.
- 8) Save your program as `LastNameFirstNameP3A.py`.

Program 3B Triangles (20 points)

Write a program to practice “if statements with compound conditions”, “nested if statements”, and “if, elif statements” and Boolean variables. Ask the user to enter the values of three sides of a triangle. First determine if the three sides form a triangle (the sum of any two sides is greater than the third side – check all combinations). If the three sides form a triangle, check to see if it is a right or equilateral triangle. Tell the user if the sides form a triangle or not. If they form a triangle, tell the user if they form a right or equilateral triangle or other triangle.

Make your program user friendly by prompting them for these values. Use one line comments to separate this program into its parts: input, and “calculations and output” which will be merged into one section.

- 1) Use a `DocString` at the beginning of the program for your comments.
- 2) Initialize all of the variables that are to be used in this program, including Boolean variables `isTriangle`, `isRightTriangle`, and `isEqualateralTriangle`.
- 3) Use print statements to display your name and period output just like those used for program 1A.
- 4) Ask the user for the values of the three sides of the triangle.
- 5) Perform all of the calculations. Determine if the three sides form a triangle. If they do, determine if they form a right triangle (use the Pythagorean Theorem) or an equilateral triangle.
- 6) Make sure that you use descriptive identifiers for all of your variables.
- 7) For the output section, echo the three sides and tell the user if they form a triangle, a right triangle, an equilateral triangle, a triangle other than the two tested, or don't form a triangle at all.
- 8) Save your program as `LastNameFirstNameP3B.py`.

Program 3C “Get Random for a While” (20 points)

Write a program to practice “while loops”. Ask the user to enter values for the number of random numbers they want to generate, and the upper limit for the random numbers that they wish displayed. Make your program user friendly by prompting them for these values. Use one line comments to separate this program into its parts: input, and “calculations and output” which will be merged into one section. **DO NOT use “while True” style loops like the textbook!**

- 1) Use a `DocString` at the beginning of the program for your comments.
- 2) Import `random`.
- 3) Initialize all of the variables that are to be used in this program.
- 4) Use print statements to display your name and period output just like those used for program 1A.
- 5) Ask the user for the values including the number of random numbers they want to generate, and the upper limit for the random numbers that they wish displayed. Use “Primed While Loops” to check that the values are within the range of 1 to 1000 for the number of random numbers displayed, and within the range of 1 to 100 for the upper limit of each random number.

- 6) Perform all of the calculations and output. Use a “count controlled while loop” to display the random numbers with 10 numbers per row (an “if statement” will help accomplish this) and format strings so that all numbers are right justified with equal spacing between the numbers.
- 7) Make sure that you use descriptive identifiers for all of your variables.
- 8) Save your program as LastNameFirstNameP3C.py.

Program 3D Menu Driven Temperature Conversion (20 points)

Write a program to convert Celsius temperatures to Fahrenheit and vice versa. Display a menu and allow the user to choose which conversion they wish to do. Use a “while loop” Boolean condition similar to the sample code at the top of page 104 that will quit the program if the user presses the enter key without making a menu choice. Make your program user friendly by prompting them for the temperatures. Use one line comments to separate this program into its parts: input, and “calculations and output” which will be merged into one section. **DO NOT use “while True” style loops like the textbook!**

- 1) Use a DocString at the beginning of the program for your comments.
- 2) Declare a constant: FREEZING_POINT_OF_WATER= 32.0.
- 3) Initialize all of the variables that are to be used in this program including celsius, fahrenheit, and menuChoice.
- 4) Use print statements to display your name and period output just like those used for program 1A.
- 5) Display a menu that looks like the following:

Main Menu: Temperature Conversion

1. Convert Celsius to Fahrenheit

2. Convert Fahrenheit to Celsius

Press enter without choosing 1 or 2 to quit

- 6) Use “if statements” to ask the user to enter the temperature, perform the calculations for the temperature conversions, and display the converted temperature. Here are the formulas:

$$\text{celsius} = (\text{fahrenheit} - \text{FREEZING_POINT_OF_WATER}) * 5.0 / 9.0$$
$$\text{fahrenheit} = 1.8 * \text{celsius} + \text{FREEZING_POINT_OF_WATER}$$

- 7) Make sure that you use descriptive identifiers for all of your variables.
- 8) Save your program as LastNameFirstNameP3D.py.