First set of non graded exercises for a better grasp on basic concepts of programming.

All of these tasks can be accomplished with loops (even while loops only), if statements, print, input, arithmetical operations, string concatenations and math.sqrt(). In order to use math.sqrt(), add this line at the beginning of the code.
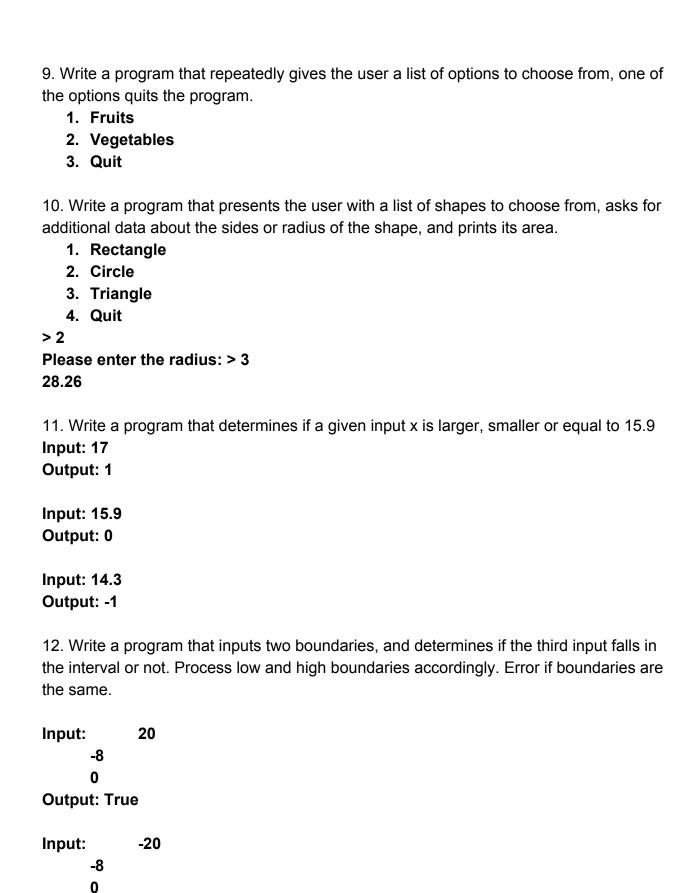
```
import math
```

Write them, modify them, tinker with them, send them to me if you want, show it to us during our office hours and problem solving sessions and last but not least, have fun with them! ^^

1. Write a hello world program.
    Output: Hello world!

2. Write a program that asks the user their name and greets them.
    Input: Hovak
    Output: Hello Hovak!

3. Write a program that asks for two numbers, prints their sum.
    Input: 4
            6
    Output: 10

4. Write a program that asks the user for their age, determines the year they were born.
    Input: 30
    Output: 1989

5. Write a program that asks for three numbers, prints their average.
    Input: 5
            6
            1
    Output: 4

6. Write a program that calculates the hypotenuse of a right triangle, given its two other edges.
    Input: a: 3
            b: 4
    Output: c: 5

7. Write a program that calculates the roots of a quadratic equation. ax + bx + c = 0. Complex roots included.
    Input: a: 1
            b: -7
            c: 10
    Output: 2, 5

8. Write a program that calculates the real roots of a quadratic equation. Gives an error message if there are no real roots.

9. Write a program that repeatedly gives the user a list of options to choose from, one of the options quits the program.
   1. **Fruits**
   2. **Vegetables**
   3. **Quit**

10. Write a program that presents the user with a list of shapes to choose from, asks for additional data about the sides or radius of the shape, and prints its area.
   1. **Rectangle**
   2. **Circle**
   3. **Triangle**
   4. **Quit**
   > 2
   Please enter the radius: > 3
   28.26

11. Write a program that determines if a given input x is larger, smaller or equal to 15.9
Input: 17
Output: 1

Input: 15.9
Output: 0

Input: 14.3
Output: -1

12. Write a program that inputs two boundaries, and determines if the third input falls in the interval or not. Process low and high boundaries accordingly. Error if boundaries are the same.

Input: 20
     -8
     0
Output: True

Input: -20
     -8
     0
Output: False

13. Write a toggle switch that turns a lamp on/off if the given input is an even number and ignores odd numbers. (Like a clicking pen)

> 2
Lamp is ON
> 8
Lamp is OFF
> 9
Lamp is OFF
> 8
Lamp is ON

14. Write a program that presents the user with a list of lights along with their status, and turns the chosen one on/off.

      1. Patio: ON
      2. Living room: ON
      3. Garage: ON
      4. Garden: OFF
      > 4
      1. Patio: ON
      2. Living room: ON
      3. Garage: ON
      4. Garden: ON

15. Write a program that presents the user with a list of items and allows the user to choose only one at a time.

      1. AUA_Wifi CONNECTED
      2. AUA_Guest
      3. Hovak's Phone
      > 2
      1. AUA_Wifi
      2. AUA_Guest CONNECTED
      3. Hovak's Phone
      > 3
      1. AUA_Wifi
      2. AUA_Guest
      3. Hovak's Phone CONNECTED

16. Write a program that prints the phrase "ALL WORK AND NO PLAY, MAKES HOVAK A VERY DULL BOY" n times, n being a user input.

17. Write a program that prints numbers between 0 and 10.

1

2

…

8

9

18. Write a program that prints odd numbers between 0 and 10.

19. Write a program that prints even numbers between m and n, with m and n being user inputs.

20. Modify that program so that it includes m and excludes n and vice versa.

[m, n) and (m, n]

21. Modify it again so that it asks user whether m and n are inclusive or not.

22. Write a program that prints even lines with an inverted color scheme.

ALL WORK AND NO PLAY MAKE HOVAK A VERY DULL BOY.
ALL WORK AND NO PLAY MAKE HOVAK A VERY DULL BOY.
ALL WORK AND NO PLAY MAKE HOVAK A VERY DULL BOY.
ALL WORK AND NO PLAY MAKE HOVAK A VERY DULL BOY.

Foreground and background colors can be changed by printing certain codes. For a list of available colors in consoles and terminal emulators refer here: https://stackoverflow.com/questions/287871/how-to-print-colored-text-in-terminal-in-python

23. Write a program that takes two numbers as roots and constructs a quadratic equation using Vieta's formula. Highlight the coefficients and use a nice unicode ² symbol for the square term.

24. Write a program that takes n and prints a line of characters, such as *, with a length of n.

Input: 6
Output: ******

NOTE: Python print function has a repeating mode for a multiplication operation. Refrain from using it and construct strings by concatenation and loops.

25. Write a program that takes n and prints a square of size n x n.

Input: 4

Output: ****

                  ****

                  ****

                  ****

==**NOTE:** Python print function has a repeating mode for a multiplication operation. Refrain from using it and construct strings by concatenation and loops.==

26. Write a program that takes n and m and prints a rectangle of size m x n, with the border and filling being user given characters.

Input: Enter m: 5

            Enter n: 6

            Enter border character: @

            Enter fill character: %

Output: %%%%%

                  %@@@%

                  %@@@%

                  %@@@% m

                  %@@@%

                  %%%%%

                    n

==**NOTE:** Python print function has a repeating mode for a multiplication operation. Refrain from using it and construct strings by concatenation and loops.==

27. Write a program that prints isosceles right triangles with a user given input n.

Input: 5

Output: #####

                  ####

                  ###

                  ##

                  #

```
    #
   ##
  ###
 ####
#####

    #
   ##
  ###
 ####
#####

#####
 ####
  ###
   ##
    #
```

28. Write a program that prints triangles like the previous one, but in the same line.

Input: 5
Output:

```
#              ###########
##        ######   ####
###      ######     ###
####   ######        ##
###########           #
```

Modify the program for different arrangements to achieve different effects.

29. Write a program that prints horizontal and vertical hourglass shapes of size n. n is odd.

Input: 7
Output:

```
#       #     #######
##    ##      #     #
# # # #        # #
#   #   #         #
# # # #        # #
##    ##      #     #
#       #     #######
```

30. Write a program that prints horizontally and vertically curled up snakes of size n x n.

Input: 5
Output:

```
1   2   3   4   5
10 9   8   7   6
11 12 13 14 15
20 19 18 17 16
21 22 23 24 25

25   16   15   6   5
24   17   14   7   4
23   18   13   8   3
22   19   12   9   2
21   20   11   10 1
```

Make liberal use of spaces to make it look good.