Topics

1. Program basics
   - Assignment statements
   - Calling functions (how to write a function call, arguments, return values)
   - Variables, rules for valid names
   - syntax, runtime, logical errors
   - how to use the input, output functions: input(), print()
   - defining functions (just the basics)
   - importing modules

2. Arithmetic
   - Operators (+, -, *, /, //, %, **)  
   - Complex expressions and order of precedence  
   - The difference between / and //  
   - Mixed expressions
   - Expression result type
   - Expressions with %

3. Data types
   - integer, floating point, string, Boolean
   - Built-in conversion functions int(), float(), str()
   - How to convert input to integer and floating point numbers

4. Formatting output
   - escape characters (\n, \t, \', ", \)
   - using the format() function for formatting floating point numbers
   - string concatenation (s1 + s2)

5. If statements
   - simple if, if-else, if-elif-else
   - nested if statements
   - relational operators (<, <=, >, >=, ==, !=)
   - boolean operators (and, or, not)
   - Truth values of Boolean expressions
   - comparing numerical values
   - comparing strings

6. String manipulation
   - len() function
   - string concatenation (+)
   - str.upper(), str.lower()
   - str.isdigit(), str.isalpha(), str.isalnum()

7. Random numbers
   - randint() function

8. Simple while loops

Evaluate the following expressions, and specify the type of the output (int, float, str, bool)
1. 2 + 6 * .5
2. 2 ** 2 / 2
3. 11 // 2
4. 11 / 2
5. 11 % 2
6. '11' + '11'
7. str(11) + str(11)
8. int('11') + float('11')
9. 4 == 2**2
10. 0 == 2 // 2
11. str.lower("cat")
12. "mouse" > "cat"
13. str.upper("mary") != "mary"
14. "y" == "Y" and "n" == "N"
15. not (100 > 50 and 50 <= 100)
16. not (100 > 50) or 50 <= 100
17. a != 100 or a == 100
18. 100 >= 50 and not (50 <= 100)
19. len("frog") < len("elephant")
20. 3 * len("frog") == 4 * len("dog")
21. 10 < 20 and 10.0 < 20.0 or 6 <= 6 and 5 == len("frog")
22. 10 < 20 and (10.0 < 20.0 or 6 <= 6) and 5 == len("frog")
23. format(2300.456, ",.2f")

Consider the expression:

a >= 1 and a <= 100
Circle the following expressions that are equivalent to this expression.

- not (a < 1 or a > 100)
- not (a < 1 and a > 100)
- a == 1 or a > 1 or a < 100 or a == 100
- a > 1 and a < 100 and a == 100

What do the following programs print?

1) 
   ```
   a = 5
   b = a
   a = a + 7
   b = b + 5
   print("a = ", a, "b = ", b)
   ```

2) 
   ```
   def hello() :
       print("Entering hello")
       goodbye()
       print("Exiting hello")

   def goodbye() :
       print("Entering goodbye")
       print("Exiting goodbye")
   
   hello()
   goodbye()
   ```

3) 
   ```
   def hello() :
       print("Entering hello")
       if "goodbye" < "hello" :
           goodbye()
       else :
           print("I hate long goodbyes")
       print("Exiting hello")

   def goodbye() :
       print("Entering goodbye")
       print("Exiting goodbye")
   
   hello()
   ```
4) 
    count = 0
    while count < 5 :
        count = count + 1
        print("count = ", count)

5) 
    salary = 64000
    if salary > 50000 :
        if salary > 100000 :
            print(" You are a highly valued customer")
        else :
            print("You are a valued customer")
    print("Thank you for your business")

    salary = 46000
    if salary > 50000 :
        if salary > 100000 :
            print(" You are a highly valued customer")
        else :
            print("You are a valued customer")
    print("Thank you for your business")

The following programs have errors. Indicate whether the error is a syntax error, a runtime error, or a logical error, and what the error is.

1) 
    count = 0
    while count < 100 :
        print(count)

2) 
    a = input("Enter a number: ")
    if a  + 4 == 7 :
        print("True")
    else :
        print("False")

3) 
    abra-cadabra = input("Enter a string: ")
    if abra-cadabra == "magic" :
        print("Tada!")

How many errors can you find in this program?

    guess = int(input("enter your number: "))
    myluckynumber = randint(1, 100)
if myluckynumber = guess :
    print('you guessed it I'd say')
elif guess < myluckynumber :
    print('try higher a higher guess than ' + guess)
else :
    print("Try again.")

Finally, you get to write some code!

1) In your program, first ask the user to enter a grade from 1 to 100. Convert the input to an integer. Print out a letter grade according to the following rule:
   90 - 100      is an   A
   75 - 99        is a     B
   60 - 74        is a     C
   below 60    is a      D

2) In your program, first ask the user to enter a number. Convert the input to an integer. Print out the integer, and indicate whether it is even or odd. For example, if the input is:

   123

Your program should print:

   123 is odd

3) Write a program that rolls a pair of dice. If the result adds up to 7, 11, or if the dice are the same (doubles), print "You win". Otherwise, print "You lose".

4) Write a program that asks the user to enter the number of feet, and converts this number to integer an integer N. Convert N to inches, and print out the result. Convert N to yards and print out the result. (Recall that there are 12 inches in a foot, and 3 feet in a yard.)

5) Write a program that asks the user to input 3 numbers, converts them to floating point, and prints out the largest of the 3 numbers.

6) Suppose the sales tax rate in Connecticut is 3%. Write a program that inputs the price of a product, convert the input to floating point, and then computes the Connecticut tax amount. Print out the total cost of the object with tax included, if you buy the product in Connecticut.

7) Assume the fare to take the subway is $2.50. If a customer swipes a metro card and the balance on it is sufficient, the fare is subtracted. Write a program that asks the user to enter a metro card balance, converts it to floating point and then
prints the new balance after swiping it.
If there is not enough money on the card, your program should print:

    Your card has insufficient fare.

8) Write a program to input a 2 digit number, and print it out in reverse:

    e.g.) if your program reads in 23, it should print it out as 32

9) The doctor's office is open from 9AM - 5 PM, Monday thru Friday.
Your program should first ask the user to enter:
    a) A day of the week (1-7, where 1 is Sunday, 2 is Monday, etc)
    b) An hour of the day (1 - 12)
    c) AM or PM
Your program should then determine whether the doctor's office is open or closed
at that time, and print out either "Office is open" or "Office is closed"

10) Write a program that reads in a number N, and adds up all of the numbers from 1 to N.

11) Write a program that reads in the area of a rectangle, converts it to an integer,
and prints out all of the possible values for the width and length of the rectangle.
(Recall that the area of a rectangle is width * length)