

Homework #3

Submission instructions:

1. You should submit your homework in the NYU Classes system.
2. For this assignment you should turn in 5 '.py' files, each containing a script for one question. Name your files 'YourNetID_hw3_q1.py', 'YourNetID_hw3_q2.py', 'YourNetID_hw3_q3.py', etc.

Question 1:

Textbook Page 144, Q4.

In an earlier set of exercises (Textbook Page 79, Q34, or Homework 2, Q1), you were asked to calculate one's BMI. Augment that program by print out where that BMI fits in the CDC standard weight status categories:

BMI	Weight Status
Below 18.5	Underweight
18.5–24.9	Normal
25.0–29.9	Overweight
30.0 and above	Obese

Question 2:

Write a program that computes how much a customer has to pay after purchasing two items.

The price is calculated according to the following rules:

- Buy one get one half off promotion: the lower price item is half price.
- If the customer is club card member, additional 10% off.
- Tax is added.

Inputs to the program include:

- Two items' prices
- Have club card or not (User enters 'Y' or 'y' for "yes"; 'N' or 'n' for "no")
- Tax rate (User enters the percentage as a number; for example they enter 8.25 if the tax rate is 8.25%)

Program displays:

- Base price - the price before the discounts and taxes
- Price after discounts - the price after the buy one get one half off promotion and the member's discount, if applicable
- Total price – the amount of money the customer has to pay (after tax) printed with precision of at most 2 decimal digits.

Hint: In order to print a number in a specific precision, you can use the `round` function passing 2 arguments to it. Use `help(round)` to get a brief explanation of this function, and try playing with it, to better understand what it does.

For example, an execution could look like this:

Enter price of first item: 10

Enter price of second item: 20

Does customer have a club card? (Y/N): y

Enter tax rate, e.g. 5.5 for 5.5% tax: 8.25

Base price = 30.0

Price after discounts = 22.5

Total price = 24.36

Question 3:

Write a program that computes the cost of a long-distance call. The cost of the call is determined according to the following rate schedule:

- Any call started between 8:00 A.M. and 6:00 P.M., Monday through Friday, is billed at a rate of \$0.40 per minute.
- Any call starting before 8:00 A.M. or after 6:00 P.M., Monday through Friday, is charged at a rate of \$0.25 per minute.
- Any call started on a Saturday or Sunday is charged at a rate of \$0.15 per minute.

The input will consist of the day of the week, the time the call started, and the length of the call in minutes.

The output will be the cost of the call.

Notes:

1. The time is to be input as 4 digit number, representing the time in 24-hour notation, so the time 1:30 P.M. is input as 1330
2. The day of the week will be read as one of the following three character string: 'Mon', 'Tue', 'Wed', 'Thr', 'Fri', 'Sat' or 'Sun'
3. The number of minutes will be input as a positive integer.

For example, an execution could look like this:

Enter the day the call started at: Fri

Enter the time the call started at (hhmm): 2350

Enter the duration of the call (in minutes): 22

This call will cost \$5.5

Question 4:

Write a program that does the following:

- Ask user to input three floating-point numbers a, b and c. They are the parameters of a quadratic equation $ax^2 + bx + c = 0$
- Classify to one of the following:
 - o 'Infinite number of solutions' (for example, $0x^2 + 0x + 0 = 0$ has infinite number of solutions)
 - o 'No solution' (for example, $0x^2 + 0x + 4 = 0$ has no solution)
 - o 'No real solution' (for example, $x^2 + 4 = 0$ has no real solutions)
 - o 'One real solution'
 - o 'Two real solutions'
- In cases there are 1 or 2 real solutions, also print the solutions.

Hint: if $a \neq 0$ and there are real solutions to the equation, you can get these solutions using the following formula:

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

The number of solutions depends on whether $(b^2 - 4ac)$ is positive, zero, or negative.

For example, an execution could look like:

Please enter value of a: 1

Please enter value of b: 4

Please enter value of c: 4

This equation has single real solution x=-2.0

Question 5:

Write a program that does the following:

- Ask user to input lengths of three sides.
- Classify it into one of the following:
 - o Equilateral triangle
 - o Isosceles right triangle
 - o Isosceles triangle that is not a right triangle
 - o A triangle that is not an isosceles and not an equilateral

For example, an execution could look like:

Please enter lengths of a triangle's sides

Length of the first side: 30

Length of the second side: 30

Length of the third side: 30

30, 30, 30 form an equilateral triangle.

Notes:

1. You may assume that the inputs entered by the user are really sides of a triangle.
2. Since floating points are only approximations to real world values, in some cases, different approximations represent the same real value. Therefore, we are more tolerant when checking if two floats are equal to one another; if they are close enough to one another we consider them to be equal.

In this question, you may assume that two floating points are equal if they are far from each other by not more than 0.00001. For example 43.25678976 and 43.256786371 are considered equal (because $|43.25678976 - 43.256786371| = 0.000003389$)