

420-SN1-RE: Programming in Science: Assignment 1

1. 📝 **Worth:** 6%
2. 📅 **Due:** Posted on LEA
3. ⌚ **Late submissions:** a penalty of 10% per day late will be deducted.
4. 📁 **Submission:**
 - Submit a single zipped folder containing all the `.py` files

Instruction updates

⚠️ Sept 19: To clear up some confusion with the instructions, I've made some updates. Look for the warning symbol (⚠️) in the following questions:

- Question 4: added clarity about how the tariff prices are supposed to work
- Question 5: added clarity about the `number_of_cakes_to_bake` variable.

Instructions

- Download the `zip` file from LEA
 - You will have individual files for each question (or each part of a question).
 - For each question, modify the appropriate `py` file.
-

Question 1

Fix the code so that it behaves the way it ought to (the way the program ought to work is defined in the code)

Question 2

Print the following numbers to the screen, one line at a time.

```
pi = math.pi
z = 322
x = -34.6
```

Note:

- make sure that the decimal points all line up
 - print to two decimal places
-

Question 3

Me and my other fellow elves are packing toys for Santa (we start early).

When I start my shift, there are a number of boxes of toys completely packed.

There is another box with that was not quite full.

During my shift, I packed x number toys

Variables

```
toys_per_box = 13          # how many toys can fit into a box
full_boxes = 5             # number of boxes that are completely full
partially_filled_toys = 3  # number of toys in the box that is partially filled
x = 337                    # number of toys I packed during my shift
```

Note:

- Using the variables given in the starter code, write python code that will calculate how many FULL boxes of toys there are at the end of my shift
- Print the number of full boxes at the end of my shift.

To ensure your code works, change the values of the variables in the code see if your calculation works properly. Do this again and again until you are satisfied that your code works for any values

Question 4

Let's use programming to predict the affect of tariffs on the prices of common goods.

1. Farmer charges x dollars for the product, to a wholesaler in another country

2. Wholesaler pays 25% of the purchase price to the government ⚠️ **ONLY WHEN TARIFFS ARE IMPOSED**
3. Wholesaler sells the product for 15% more than their cost to the store
4. The store adds another 20% to the price that the consumer has to pay

Part I

Using the following variables:

```
dozen_eggs = 4.0  
bread = 3.0  
orange_juice = 5.0
```

- Write code to calculate the consumer price of 3 dozen eggs, 4 loaves of bread and 2 orange juice **assuming NO tariffs**.
- Print the cost
- Write code to calculate the consumer price of 3 dozen eggs, 4 loaves of bread and 2 orange juice **assuming tariffs have been imposed**
- Print the cost
- Write code to calculate the difference in price between the “no tariffs” and “tariffs” cost.

Part 2

Assume that the average grocery bill includes \$450 per month of food that will now be tariffed.

- Write code that would calculate the increase in the monthly grocery bill

Question 5

You own a bakery which makes **OMA'S BOTERKOEK** (Grandma's butter-cake)


- You can only buy butter in 1kg containers.
- You can only buy brown sugar in 25kg bags
- You can only buy eggs in 5 dozen containers
- You can only buy flour in 25kg bags
- You can only buy almond extract in 5kg bottles.
- You can only buy baking powder in 1kg bags

Currently, you have no ingredients in stock.

The recipe for one cake is:


- 160 g butter
- 240g brown sugar
- 7.5g almond extract
- 1 egg
- 355g flour
- 2.5g baking powder


Complete the program in the file `question_5_recipe.py` that:

-  Uses the `number_of_cakes_to_bake` variable
- Prints how many containers of each ingredient you need to buy based on the value of `number_of_cakes_to_bake`

Example: When your code works well, and the value of `number_of_cakes_to_bake` is 100 , your program should print the following:

```
To make 100 butter cakes, you need to buy:
16 containers of butter
1 bags of sugar
1 bottle of almond extract
2 cartons of eggs
2 bags of flour
1 containers of baking powder
```

 **IMPORTANT:** Try setting `number_of_cakes_to_bake` to different numbers, and ensure that the resulting ingredient amounts make sense!

 Hints:

- use `math.ceil` function to round up ingredient amounts. See [Math Functions](#) in the course notes.
- OPTIONAL, BONUS: you can use the python `input()` and `int()` function to set the value of the `number_of_cakes_to_bake` function after running the program, instead of writing the value of the variable in code yourself. We haven't learned how to do this yet, so it's optional: you can try following [this example from RealPython.com](#).

Assessment

Functionality (90%)

- all code does what it is supposed to do

Code Quality (10%)

- use well defined variable names
- define variables for *numbers* that are re-used often (ex. `tariff_percentage = 25`)