The purpose of this assignment is to practice using basic expressions and statements effectively, as well as getting input from the using and displaying results onto your terminal window.

<div align="center">

Due Date: Sunday, September 8th, 11:59pm
5% Extra Credit Due Date: September 5th, 11:59PM

</div>

See the "project basics" file for more detailed information about getting assistance, running the test file, grading, commenting, and many other extremely important things. Each project is governed by the rules in that document.
- https://cs.gmu.edu/~marks/112/projects/project_basics.pdf

Needed files: download these in order to use the actual tests we will use when grading your work.
- https://cs.gmu.edu/~marks/112/projects/testerP1.py
- https://cs.gmu.edu/~marks/112/projects/testsP1.txt

Background
Programs are more interesting when they involve the user – supplying values to use in calculations, asking for names, and so on. We can get a string from the user via the **input()** function, and then convert to other types as needed via other built-in functions of Python, such as **int()**, **float()**, and **bool()**.

Variables give us the chance to store values for later, recallable by name. We can even repeatedly update the value associated with that name, as a replacement: forgetting the old value forever, remembering the new value until further notice. As procedural programs are very much a sequence of executed instructions, the exact order of when we store (or replace) a value for a variable, and when we look up and use the current value, is an important part of understanding how to create the solution to a programming task.

This project will get us comfortable getting values of various types from the user and using variables while calculating different things. The next projects will explore control structures like branching and loops, so be sure to master these more basic tasks.

The task for this project is to calculate the number of cake slices that you can make given a set of dimensions.

Restrictions
You can ask for additional functionality to be allowed, but the chances are slim that we will approve it. The general theme is, *the interesting parts of the assignment must be completed by the student, not built-in functions.*

Allowed things:
- **Any arithmetic operators** are all fine to use, such as **+**, **-**, *****, **/**, **%**, **and**, **or**, **>=**, **<**, etc.
- **The following data types, and their casting functions: int**, **float**, **string**, **bool**. No others.
- **These functions: input()**, **round()**
- **Note:** Not everything listed above is needed for the project.

Disallowed things:
- You **may not import** other modules (like math) or write your own functions.
- No data types omitted from the "Allowed things" section above may be used.
- **No branching** (if statements), **or loops** (for/while).
- If [insert thing here] is not specifically listed in "allowed things" chances are >95% that it's not allowed.

Procedure

We are going to use our programming skills to compute the number of slices you can cut out of a cake of certain dimensions. Create your python file, following the instructions from the project basics file. Perform the following actions in your code (**in exact order!)**, storing their answers as needed in variables.

1. Greet the user with the message, **"Welcome to the Cake Slice Program! "**
2. Ask the user: **"What kind of cake did you make? "**
3. Ask the user: **"How long is the cake in centimeters? "**
4. Ask the user: **"How wide is the cake in centimeters? "**
5. Ask the user: **"How long will you cut your slices in centimeters? "**
6. Ask the user: **"How wide will you cut your slices in centimeters? "**
7. Compute the surface area of the cake, and display it to the user
8. Compute the number of pieces of cake that can be cut, and display it to the user.
    a. You should also determine the amount of cake area that the cake slices will consume, and display that as a percentage.
9. Compute the amount of cake that wasted by cutting it into slices, and display that to the user.
    a. You should also determine this number as a percentage of the total area of the cake, and display that to the user.
10. Compute the number of edge and center pieces in the cake, and display that to the user.
    a. Below, we assume that there will always be four edges of the sliced cake. Be sure that you don't double count the corner pieces!
    b. Ignore the wasted cake, and calculate edges/centers out of the rectangle of actual cake slices.
11. Tell the user to enjoy their cake!

Assumptions

In computer science exact formatting of input/output is like putting on socks with shoes, while people might not do it 100% of the time in their personal life, it is extremely unusual not to do it in a professional setting. Therefore, **you will need to format your input/output exactly like the samples provided.** As we are just starting to program, and don't even have if-else statements at our disposal, we will assume many things to make the project easier, though it makes the project slightly more artificial.

You may assume the following:

- **The user will always enter an integer when we ask for an integer, etc.**
- **Every number the user enters will be a positive number when testing this project.**
- **The length of a slice will be less than half the length of the cake.**
- **The width of a slice will be less than half the width of the cake.**

On "wasted cake:"

For this project, assume that we start to cut the cake from one corner, and work our way down one side of the cake. When you reach the end of that side, you continue the same cutting process for the next row of cake. If you get to a point where there is a leftover amount of cake on any side (that is less than the size of the slice down that side) then you just throw away that leftover bit. If there is a leftover amount of cake on both sides, then you have to throw away the opposite corner of cake too!

The number that you are figuring out for "wasted" cake is the total amount of cake that gets thrown away because it cannot be cut into a slice via this edge throwaway method.

Visual Examples

Suppose that we have a 5x5 cake (here, you see it broken up into one by one pieces/units):
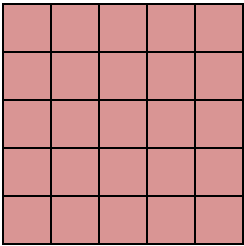
This cake, when cut into 2x2 pieces, would look like this when we start cutting from one corner:

e	e	w
e	e	
w		w
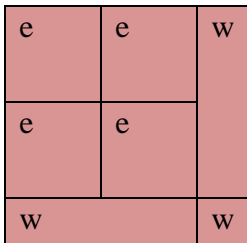
You can see we get four total slices of cake, with a total area of 16. We have 9 total units that are leftover. So, the amount of cake used for the slices is 16/25, or 64%, and the amount wasted is 9/25, or 36%. If we remove the wasted cake, you can see that of the slices created there are 4 total edge pieces and no center pieces.

Let's say we have a 7 by 7 cake, and we want to cut the same 2x2 slices. You would cut it like this:

e	e	e	w
e	C	e	
e	e	e	
w		w	
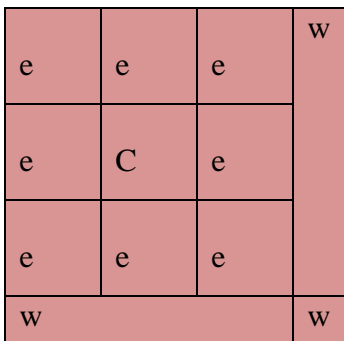
There are 9 total 2x2 pieces that we can cut, for a total area of $36cm^2$ (73% of the cake). That leaves us with 13 cm^2 of wasted cake (27% of the cake). There are 8 total edges of sliced cake (marked as e), 1 center (marked as c) and 3 sections of waste (w).

Here's an example that is not a square cake (it's a 10 by 7).
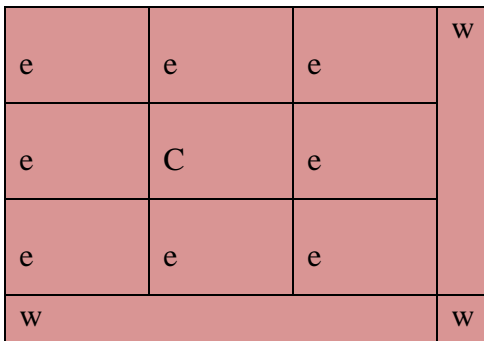
Here it is in one by one pieces:
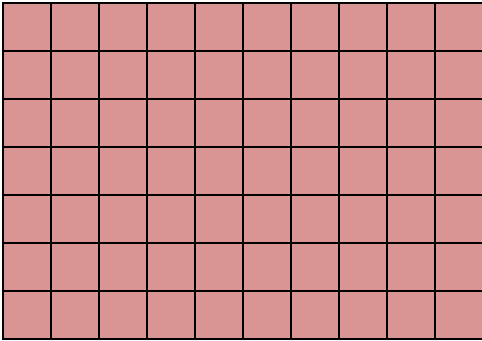
70 cut slices
- 70 square centimeters, 100% of the cake
- 30 edges, 40 centers
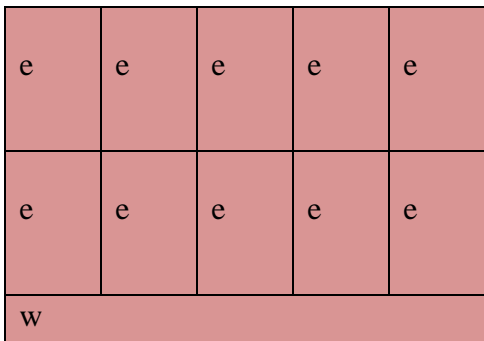
No waste!

3 by 2 slices:

9 cut slices
- 54 square centimeters, 77% of the cake
- 8 edges, 1 center

16 square centimeters of waste, 23% of the cake

2 by 3 slices:

10 cut slices
- 60 square centimeters, 86% of the cake
- 10 edges, no centers

10 square centimeters of waste, 14% of the cake

Testing Your Code

The tester for this project expects exact matching to pass a test case. If you're getting the right numbers but failing test cases, check for spacing issues, capitalization, spelling errors, and so on – look closely, and you can figure it out! You get to see the exact tests we'll use when we grade your code, so you might as well get them all correct before turning in your work! No surprises there.

One note, the OUTPUT section of the tests only includes what the program is supposed to print, and does not include the characters that a user would be typing during the interaction (including when the user hits enter for a newline). This makes the output look a bit weird, but the testing file is correct. Once we learn about functions, we will jump to the real style of testing.

To test your code with the provided tester, first make sure that you have downloaded the files "testerP1.py" and "testsP1.txt" into the same folder as your project code. Then, from that directory, run the following command:

```
demo$ python3 testerP1.py mpneary_2B1_P1.py
...............

+++++++++++++++++++++++++++++++++++++++++
+++++++++++++++++++++++++++++++++++++++++

passed 15/15 tests.
```

If you pass all of the tests, you will see the above contents. If you don't pass a test, you will be informed of where the mismatch in your output is, and you can figure out from there what needs to be fixed.

Example Run

In the examples below, **green text** starting with 'demo$' is the operating system's prompt (**demo$**) and the command you write to run python (**python3 code.py**), **blue** underlined text is the input given by the user, and **purple text** is the output that your program generates:

```
demo$ python3 mpneary_239_P1.py
Welcome to the Cake Slice Program!
What kind of cake did you make? vanilla
How long is the cake in centimeters? 4
How wide is the cake in centimeters? 4
How long will you cut your slices in centimeters? 2
How wide will you cut your slices in centimeters? 2
Your cake has a surface area of 16 square centimeters.
You can cut 4 total 2x2 slices of cake.
These slice dimensions can cut a total of 16 square centimeters, or 100%, of the cake.
These slice dimensions will waste 0 square centimeters, or 0%, of the cake.
There will be 4 edge pieces, and 0 center pieces of cake.
Enjoy your vanilla cake!
demo$
demo$ python3 mpneary_239_P1.py
Welcome to the Cake Slice Program!
What kind of cake did you make? chocolate
How long is the cake in centimeters? 10
How wide is the cake in centimeters? 10
How long will you cut your slices in centimeters? 3
How wide will you cut your slices in centimeters? 3
Your cake has a surface area of 100 square centimeters.
You can cut 9 total 3x3 slices of cake.
These slice dimensions can cut a total of 81 square centimeters, or 81%, of the cake.
These slice dimensions will waste 19 square centimeters, or 19%, of the cake.
There will be 8 edge pieces, and 1 center pieces of cake.
Enjoy your chocolate cake!
demo$
```

Creating Files, Testing Your Code, and Submitting Your Project

Make sure to read the "project basics" file (available on Piazza under Resources)

Grading Rubric:

```
Correct submission:                     5
Well-documented:                       20
Calculations correct:                  75
---------------------------------------
TOTAL:                                100
+ 5% Early EC:                        105
```

Note: If your submission does not run (immediately crashes due to errors), it will receive at most 50%. No exceptions. As stated on our syllabus, turning in running code is essential.