CMPT 165

Assignment 1

Towards confidence, through buying a really big hat

Deadline: September 21st, 2016
Last revision: September 6, 2016

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1 A most unusual city...

New VanSurBur is a large, if almost completely unknown, city. It cannot be found on any maps. It belongs to no country and to all countries at the same time. No one puts it down on the census as a place of their origin. No tax revenue is reported as coming from there, and consequently no government agent will ever know anything about it. Despite being the most beautiful place in the universe, no pictures taken in New VanSurBur exist.

With this profound lack of evidence, you could almost say that New VanSurBur is nothing but a finicky fake, a frivolous fabrication, a funny forgery, a fancy falsehood, a fine fable, a freakish fantasy, or a fictitious folly. You are welcome to say whatever you want about it. I know what it means to me. I call it home.

The journey to New VanSurBur is actually quite simple, but unfortunately the instructions to get there vary from one person to another. For me it always starts on the intersection of Imagination Drive and Whimsy Street. I have to look at the stars, smile, close my eyes and make a wrong turn. A few steps later, I somehow find myself right next to the New VanSurBur's transit center, one short bus ride from anywhere in the city.

I spend most of my time in the Lakeshore district. A great place. I'm constantly surrounded by interesting people. Lizzie is my good neighbor, one I have known since time immemorial. She is a mathematician of extraordinary talent, but suffers from crippling self-doubt. On a bad day she is afraid of doing simple arithmetic, for the fear of getting $1 + 1 = X$ wrong. Her birthday is coming soon, and I'd like to help her out. My first idea was that I should go and some confidence to give to her as a gift.

Thankfully, right next to Lakeshore there is the bazaar. The place is called "oaboaT". It is a most wonderful marketplace where you can find absolutely everything. I have purchased very many things from there in my long time as a customer. Yesterday I went there to shop for a few kilograms of confidence, as a gift for Lizzie. After all, you can buy absolutely everything at the bazaar, right?

Well... Make that almost everything. Turns out that you cannot buy confidence. True confidence is something you have and just cannot buy. I was a bit sad about it, but I did come up with a new plan. Lizzie dreams of being as smart as "the eggheads at the university". Everyone in New VanSurBur knows that smart people often have big heads. A big head needs a big hat. If I get Lizzie a big hat, then maybe she will gain some confidence. I can buy a hat easily enough!

This is where you come in, my friend. There are just too many hats for sale on oaboaT. Every hat that has ever existed is for sale. I cannot pick through all of them to find the biggest one. You need to help me out. You can program a computer, right? Great. Here's the plan. I will give you a list of all hats that are for sale. I would like it if you would be willing to write me a program which will identify the biggest hat on the list.

Whatever you do, please hurry! The birthday is just in a couple of weeks! Both Lizzie's happiness and possibly even the entire future of mathematics depend on you!

2 Logistics

For this assignment you need to write a series of functions in the Python 3 language. You will only be marked on the output of the last stage, the other stages exist solely to let you get used to programming and to put you on trail of ideas that you will need for the last part. Put your source code into a file called `code.py`. Name your function `stage8`. Make sure to test your code with the testcases given by the TA. We won't look at your code. You can code as messily or as cleanly as you like, we only care about the results.

You are welcome to ask us for help with all stages of the assignment. We won't reveal a solution to stage 8, so please don't ask. We are not going to deprive you of the joy of solving that problem yourself.

3 Stage 1: How long is...?

To find the biggest item on a list is a hard task for where you are in the ginormous world of computers. Don't worry. I will break down the task into multiple steps. This is step 1.

Write a function that, given as input a list of items, prints the length of the list. That's it.

4 Stage 2: As easy as 1, 2, 3.

Write a function that, given as input a list of items, prints the numbers from 1 to N, where N is the count of items in the list. Print each number on a line by itself. You will need a loop here. That's it.

5 Stage 3: What's in the list?

Write a function that, given as input a list of items, prints the numbers from 0 to $N - 1$, where N is the count of items in the list. Follow each number with the item from the list at the position corresponding to the number just printed.

6 Stage 4: Thrice's the charm!

Write a function that takes as input three lists. The first list will have the names of various hats for sale. The second list will have the sizes of the hats. The third will have the prices. The lists are ordered to match the hats with their characteristics. The hat at the position X in the first list will have its size at position X in the second list and the price at position X in the third list.

Print each hat in the list, followed by the price of the hat, followed by the size of the hat. Each hat should be on one line.

Given lists:

- `[fedora, trilby, sombrero]`
- `[10,20,40]`
- `[5,2,7]`

your program should print:

```
fedora 5 10
trilby 2 20
sombrero 7 40
```

Careful! Order really matters. The leftmost list in your function's inputs must be the list of hat names. The second list must be the list of sizes. The third must be the list of prices. The order of outputs is different: First the name, then the size, then, finally, the price.

7 Stage 5: The very best...

We are back to processing a single list of numbers. Write a function to find the largest item in the list and to print it. You need to look through the entire list to find the biggest item. You will most likely need a conditional for this one.

8 Stage 6: The why of where.

Write a function to find the largest item in the list and to print its position in the list. That's it, almost exactly the same as the previous one.

9 Stage 7: Almost done!

Write a function with three input lists, just like in stage 4. Find the hat with the biggest size and print the name and the price of that hat.

10 Stage 8: Last stage

Write a function which takes the usual three lists as inputs. In addition, take one more input, an integer that I will call M. Print M largest hats in the usual format of name followed by the price. You are guaranteed that you will be given at least $M+1$ items in your list.

There are multiple ways of doing this. The simplest one is to perform the search M times, each time making sure that the item found to be the biggest won't be found again. You can use your creativity here. There is no single right or wrong solution here. Some are easier than others, but whichever one you get the correct answers with will give you full marks.

You will be only marked on this function. Nothing else is worth any marks. The only thing that gives you marks is functioning code performing correct computations and conforming to other requirements that we set out. Beautiful code that does not work correctly is worth nothing.

Good luck and have fun with it!

11 Resources

I know we are asking a lot from you at this stage in your programming career. Don't worry too much though, we will help you.

To make things easier for you, I have prepared the resources section of the course website. You will find links to Python tutorials and courses that you can use to get up to speed if the lecture materials aren't to your liking.

You can ask us for help. The email to use is in the course handout. We don't do help right before the deadline, but otherwise we are there for you.

You also should remember about your right to a single assignment extension. While it probably isn't the best idea to use it on the first assignment, it might be necessary if you don't manage your time well. Start early, keep up the effort and you will be done in no time. The correct solution is maybe 20 lines of code long.

12 Notes

You can use this space for your own notes.