Programming, Probability, and the Modern Mathematics Classroom
Starter exercises — Part 0

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May 25, 2013

If you are reading this, please make sure to have read the blog post with the same topic name on the Math Misery website, otherwise this will be out of context.

Working with the interface

I will be using the IDLE IDE that comes with a standard install of Python. I am on Python 3.1.x. Though, most of what is written shouldn't really be affected if you are using later installs of Python.

The first thing we want to do is make sure that students understand the interface with which they will be working. Python's tutorial is fairly good and I would recommend that the instructor go there for a deeper look.

Now, here's a quick crash-course about the command line. I am relying on Python's intuitive appeal so that I don't have to explain everything that's going on. I encourage that the instructor let students fiddle.

Command line basics

```
>>> 3 + 4
7
>>> 3 * 4
12
>>> 3 ** 4
81
>>> 3 - 4
-1
>>> 3/4
0.75
>>> 3//4
0
>>> 3%4
3
>>> 4%3
1
>>> 4/3
1.3333333333333333
>>> 4//3
1
```

```
>>> a = 7
>>> b = 3
>>> a + b
10
>>> a
7
>>> b
3
>>> c = a*b
>>> a
7
>>> b
3
>>> c
21
>>> a = b
>>> a
3
>>> b
3
>>> c
21
```

Working with lists

One simple warning: copying lists and lists of lists are two different things. Please read about "deep" versus "shallow" copying. Use the `copy` module if "deep" copies are desired.

```
>>> x = []
>>> type(x)
<class 'list'>
>>> x.append(3)
>>> x
[3]
>>> x.insert(0,"hi")
>>> x
['hi', 3]
>>> len(x)
2
>>> x.pop()
3
>>> x
['hi']
>>> len(x)
1
>>> x.insert(1,232)
>>> x
['hi', 232]
>>> x.insert(1,53234)
>>> x
['hi', 53234, 232]
>>> x[0]
```

```
'hi'
>>> x[1]
53234
>>> x[2]
232
>>> x[3]
Traceback (most recent call last):
  File "<pyshell#43>", line 1, in <module>
    x[3]
IndexError: list index out of range
>>> x[-1]
232
>>> x[0:2]
['hi', 53234]
>>> x[1:]
[53234, 232]
>>> x[:1]
['hi']
>>> x[1:3]
[53234, 232]
>>> x
['hi', 53234, 232]
>>> x + [23,54,24]
['hi', 53234, 232, 23, 54, 24]
>>> x
['hi', 53234, 232]
>>> x = x + [23,54,24]
>>> x
['hi', 53234, 232, 23, 54, 24]
>>> x*2
['hi', 53234, 232, 23, 54, 24, 'hi', 53234, 232, 23, 54, 24]
>>> x = x*2
>>> x
['hi', 53234, 232, 23, 54, 24, 'hi', 53234, 232, 23, 54, 24]
```

Working with strings

```
>>> s = "hi there!"
>>> s[0]
'h'
>>> len(s)
9
>>> s[1:6]
'i the'
>>> s.pop()
Traceback (most recent call last):
  File "<pyshell#53>", line 1, in <module>
    s.pop()
AttributeError: 'str' object has no attribute 'pop'
>>> s.append(" ho!")
Traceback (most recent call last):
  File "<pyshell#54>", line 1, in <module>
```

```
    s.append(" ho!")
AttributeError: 'str' object has no attribute 'append'
>>> s = s + " ho there!"
>>> s
'hi there! ho there!'
>>> len(s)
19
>>> s[6:12]
're! ho'
>>> words = s.split()
>>> words
['hi', 'there!', 'ho', 'there!']
>>> words[0]
'hi'
>>> type(words)
<class 'list'>
>>> words[0][0]
'h'
>>> words[1]
'there!'
>>> len(words[1])
6
>>> words[1][1:]
'here!'
>>> s
'hi there! ho there!'
>>> s.split("!")
['hi there', ' ho there', '']
>>> s.capitalize()
'Hi there! ho there!'
>>> s.count("he")
2
>>> s.find("ho")
10
>>> s[10]
'h'
>>> s[10:12]
'ho'
>>> s = "in front is ... " + s
>>> s
'in front is ... hi there! ho there!'
```

Other things

There are other types like dictionaries, sets, maps, tuples, etc. Tuples can be thought of as "immutable" lists. That is once a tuple has been created, it cannot be modified. Thus, the user can only query the tuple.

Dictionaries, sets, and other types are a bit more advanced and they will be introduced appropriately in later exercises.

Summary

Hopefully, this will get your students started with understanding how the interface works. Once they feel comfortable enough, feel free to go to the next set of exercises which will introduce functions, for loops, if-else statements, etc. If you need help, have questions, or would like to set up a workshop at your school get in touch with me at help@mathmisery.com.