CS 150
Exam Three

Revision Date: June 17, 2014

If you have not yet downloaded the scanner, do so now:

```
wget troll.cs.ua.edu/cs150/projects/scanner.py
```

This exam has a total of 100 points. There is some extra credit. Generally, there is no partial credit for a task.

You must put all your programs in the correct directories and submit from the specified directory or you will receive no credit for the misplaced programs.

Task 1: Linux (10 points)

Create a directory named *exam3* that hangs off your `~/cs150/` directory. Inside the *exam3* directory, create four directories: *a2*, *a3*, *a4*, and *a5*.

Now, while in the `~/cs150/exam3` directory, type the system command:

```
du
```

You should see the following output:

```
4   ./a2
4   ./a3
4   ./a4
4   ./a5
16  .
```

The names must be as shown, but the order and the numbers do not matter.

Task 2: (30 points)

Move into your *a2* directory. You are to create a file named *a2.py*.

In *a2.py*, define a *main* function that allows you to input a list of numbers from the keyboard. After the user has entered the list, your program should determine whether or not the first number in the list is also present in the remainder of the list. Make sure to call your *main* function.

Example input and output:

```
ubunu@ubuntu:~/cs150/exam3/a2$ python3 a2.py
enter a list of numbers enclosed in brackets: [4,2,6,3,5,4]
yes

ubunu@ubuntu:~/cs150/exam3/a2$ python3 a2.py
enter a list of numbers enclosed in brackets: [4,2,6,3,5,5,0]
no
```

In the first case, 4 appears in the list [2,6,3,5,4] so the program outputs *yes*. In the second case, 4 does not appear in the list [2,6,3,5,5,0], so the program outputs *no*.

You can use the *input* function in conjunction with the *eval* function to input a list of numbers:

```
    numbers = eval(input("enter a list of numbers enclosed in brackets: "))
```

Also, given a list named *items*, you can get the list of all the elements of *items*, except the first one, with the expression:

```
    items[1:]
```

Task 3: (30 points)

Move into the *a3* folder. Create a file named *a3.py* and place in it a program that takes in a list of numbers from the command line and prints out the largest number in the list. The input will come from the command line.

Example input and output:

```
ubunu@ubuntu:~/cs150/exam3/a3$ python3 a3.py 4 14 8 3 2 9
14

ubunu@ubuntu:~/cs150/exam3/a3$ python3 a3.py 1 2 3 4 5
5
```

You can use this *map* function to convert a list of strings (representing numbers) to a list of numbers:

```
def map(f,items):
    result = []
    for i in range(0,len(items),1):
        result = result + [f(items[i])]
    return result
```

You should call the *map* function in your *main*:

```
    numbers = map(eval,sys.argv[1:])   # skip 1st command line arg
```

in order to convert the command-line arguments from strings to numbers.

Task 4: (30 points)

Move into the *a4* folder. Create a file named *a4.py* and place in it a program that inputs a list of numbers from a file and prints their sum. The file name comes in as a command-line argument.

Assuming the file *apple* contains the numbers:

```
4    14
5
```

your program should behave as follows:

```
ubunu@ubuntu:~/cs150/exam3/a4$ python3 a4.py apple
23
```

Assuming the file *orange* contains the numbers:

```
6    26   10
   8
```

your program should behave as follows:

```
ubunu@ubuntu:~/cs150/exam3/a4$ python3 a4.py orange
50
```

You will, of course, need to create files with numbers in them in order to test your program.

Task 5: (extra credit 20 points)

Move into the *a5* folder. Create a file named *a5.py* and place in it a program that does exactly the same thing as the Task 2 program, except that the numbers are input one at a time. Use the letter `'q'` to signify the end of input.

Here is an example:

```
ubunu@ubuntu:~/cs150/exam3/a5$ python3 a5.py
enter a number, 'q' to stop: 5
enter a number, 'q' to stop: 6
enter a number, 'q' to stop: 2
enter a number, 'q' to stop: 5
enter a number, 'q' to stop: 9
enter a number, 'q' to stop: q
yes
```

Since the first number entered, 5, appears subsequently, the program outputs *yes*.

Submitting your exam

First, move into your `~/cs150/exam3` directory. Then run this system command:

```
du -a
```

You should see the output similar to:

```
4   ./a2/a2.py
4   ./a3/a3.py
8   ./a4/a4.py
4   ./a4/orange
4   ./a4/apple
8   ./a4/scanner.py
8   ./a5/a5.py
40  .
```

Extra files and directories are OK and, as before, the order and numbers do not matter.

Submit your solutions while in the `~/cs150/exam3/` directory with the command:

```
submit cs150 brown practice3
```