Week 1

Theory

1. Convert the following decimal numbers into binary and hexidecimal:

    - 14
    - 63
    - 255
    - 300

2. Convert the following binary numbers into and decimal and hexidecimal:

    - 00101000
    - 10111010
    - 01100110

3. Add the following numbers in binary (show your working and carry-bits)

    - 00101000 + 10110010
    - 01101011 + 00110001
    - 10101011 + 10110001 (notice what happens).

4. Write the following hexidecimal as binary and as decimal:

- 01
- 0B
- 66
- C5
- FF

Digital Circuits

Python

1. What are the types of the following (use the 'type()' function):

    - 6
    - 6+8
    - 3*2
    - 4.3
    - 6 + 4.3
    - [3,4,5]
    - [3,4,5] + [2,3]

- “Hello”
- “Hello” + " world"

2. Given the list of floats:

   ```
   heights = [1.82, 1.70, 1.68, 1.85, 1.78, 1.58]
   ```

   write a for-loop that

   ```
   i. adds all the numbers up
   ii. finds the mean
   ```

3. Given a list that contains 8 ’0’s and ’1’s, for example:

   ```
   bits = [0,1,1,0, 0,0,1,0]
   ```

   write code that turns this into a decimal number and print it out.

4. (Harder) You can join 2 strings with ‘+’, for example:

   ```
   mystring = "Hello" + " " + "world"
   ```

   given a list of strings

   ```
   list_of_strs = ["Alpha","Beta","Gamma","Delta"]
   ```

   use a loop to turn this into a single string:

   ```
   "Alpha - Beta - Gamma - Delta"
   ```

Linux

There are lots of excellent programs for linux. Try installing the following (sudo apt-get install XX):

```
inkscape
chromium-browser
frozen-bubble
```

Once they are installed, you can either run them from the commandline-or find them on the start menu.

Week 2

Types & Operators in Python

What is the resulting type of the following operations on types? (Note, that not all of them are valid!)

- *int* + *int* =>
- *int* - *int* =>
- *int* * *int* =>
- *int* / *int* =>

- *float* + *float* =>
- *float* - *float* =>
- *float* * *float* =>
- *float* / *float* =>

- *float* + *int* =>
- *float* - *int* =>
- *float* * *int* =>
- *float* / *int* =>

- *int* + *float* =>
- *int* - *float* =>
- *int* * *float* =>
- *int* / *float* =>

- *string* + *string* =>
- *string* - *string* =>
- *string* * *string* =>
- *string* / *string* =>

- *string* + *int* =>
- *string* - *int* =>
- *string* * *int* =>
- *string* / *int* =>

- *list* + *list* =>
- *list* - *list* =>
- *list* * *list* =>
- *list* / *list* =>

- *list* * *int* =>
- *int* * *list* =>
- *list* * *float* =>
- *string* * *int* =>

Week 3

Python

What are the values of:

```
a = [1,2,3] + [4,5,6]
b = [[1,2,3]] + [ [4,5,6], [7,8,9] ]
c = a[0]
d = b[1]
e = b[1][2]

f = ['Hello', 'world']
g = f[1]
h = f[0] + f[1]
i = [f[0], f[1]]
j = [g,h,g]
k = str( a[0] ) + str( a[1] )
l =  a[0] + a[1]
```

Python is excellent at processing strings: https://docs.python.org/2/library/stdtypes.html#string-methods Try out some string methods:

```
n = "Hello, world"
o = n.split(",")
p = n.replace("Hello","Goodbye")
q = n.endswith('world')
r = n.startswith('world')
s = n.startswith('Hello')
t = n.lower()
t = n.upper()
```

Interacting with real-life data:

```
 * Open up Excel, or OpenOffice.
 * Put some numbers into the first column.
 * Click "Save As...", and save the file as a CSV-file.
```

```
* Look at the file in your text editor (Sublime or gedit)
* You can read the text in this file into a big string in Python using:

    ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
    f = open("filename.csv")
    data = list(f.readlines())
    ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

depending on how the data is delimited (i.e., split into columns), work out how to print the rows on the screen.