Exercises 1

1. a) Create two variables, one representing Alan's current amount of money (£1500), and one representing Alan's monthly wages (£762).

   b) Alan get's paid. Update the value of the variable representing Alan's money to reflect this.

   c) Alan has a pay rise. He now earns 10% more than before. Update the value of the variable representing Alan's wage to reflect this.

   d) Alan is paid again, update Alan's money to reflect this.

2. a) Consider the following code:

```
>>> first_name = 'Bianca'
>>> middle_name = 'Betty'
>>> surname = 'Brown'
>>> full_name = first_name + middle_name + surname
```

   How would you ensure that the variable `full_name` included spaces between the names?

   b) Create the same three (or more if required) variables to correspond with your own name.

3. Create all possible Boolean variables from the numbers 6 and 2.5 (for example `6 == 2.5` is a Boolean variable).

4. The following code gives the number of roots to a polynomial $ax^2 + bx + c$ with coefficients $a = 1$, $b = 1$ and $c = 1$ respectively:

```
>>> a = 1
>>> b = 1
>>> c = 1
>>> discriminant = (b ** 2) - (4 * a * c)
>>> if discriminant < 0:
...     number_of_roots = 0
>>> if discriminant == 0:
...     number_of_roots = 1
>>> if discriminant > 0:
...     number_of_roots = 2

>>> number_of_roots
0
```

Use the above code to find the numbers of roots to the following polynomials:

a) $x^2 - 3x + 4$

b) $2x^2 - 10x + 1$

c) $4x^2 + 4x + 1$

d) $-7x^2 + 7x - 7$

5. Write some code that assigns a value to the variable v according to the Heavyside function:

$$H(x) = \begin{cases} 0 & \text{if } x < 0 \\ 0.5 & \text{if } x = 0 \\ 1 & \text{otherwise.} \end{cases}$$

6. a) Create a list `modules` containing strings of the modules that your are taking in your degree programme.

   b) Sort the list alphabetically.

   c) Add a new module `'MAT777'` to the list.

   d) Remove the module `'MAT004'` from the list.

7. a) In no particular order, create a list of 8 of your favourite numbers.

   b) Find the maximum value in the list.

   c) Find the minimum value in the list.

   d) Find the length of the list.

   e) Sort the list.

   f) Find the 2nd element in the list.

   g) Find the last element in the list.

   h) Find the 3rd to 6th elements in the list.

8. Consider the following code:

```
>>> prime_list = [2, 3, 5, 7, 11, 13]
>>> prime_tuple = (2, 3, 5, 7, 11, 13)
```

Demonstrate how `prime_list` and `prime_tuple` are different.