Assignment 3 (Due Friday 11th October):

Task: Extend your code from Lab 7, Q8 to integrate a function of three variables over a volume.

Details:

You should create a function monty3d that can be called in the following way (see **testfile1.py**):

```
 8    import myquad as myq
 9
10    def region(x,y,z):
11        return x**2+y**2+z**2<1**2
12
13    def f(x,y,z):
14        f = 1
15        return f
16
17    a,b = -1,1
18    M = 20
19    I = myq.monty3d(f,region,a,b,M)
20
21    print(I)
```

The function **monty3d** should therefore be contained within your own myquad.py module.

The inputs to monty3d are:

f(x,y,z)	a floating point function of three variables
region(x,y,z)	a function that specifies the integration region, returning "1" if the point (x,y,z) is in the integration region, and "0" otherwise, to
a,b:	the box in which the Monte-Carlo sampling takes place. For 3D the sample points should lie within a rectangular prism $x \in [a,b]$, $y \in [a,b]$, $z \in [a,b]$.
M:	the number of sample points for the Monty-Carlo method, given by 2^M.

The output should be a single real number that returns the value of the integral (see **output1.txt**):

```
In [2]: run testfile1
4.189048767089844
```

Important notes:

The module must work on the first try, and for an arbitrary function and region as an input. If it does not then marks will be deducted.

Try to make you code as robust as possible so that it does not miss any zeros. You may have to modify your bracketing procedure to do this.

Files to submit:

You should upload (only) the following files:

myquad.py   - a python module that contains the **monty3d** function, as well as any other functions that it needs to run

Lab7_Q8.py   - the code from Lab 7 that you used/adapted to create your bracketing function.

This can be your own code or from the provided solutions.

Grading:

The code will be graded according to the following scale:

Compliance: This is whether the code is submitted as instructed	30%
Effectiveness (i.e. whether the code passes independent tests):	50%
Comments (whether they are comprehensible):	20%

Important information (academic integrity):

1. You have to write the code yourself. Any copying of code from an external source other than the lab solutions that you provide will result in a mark of zero being awarded.

2. **The code must be clearly adapted from your Lab solutions.** If the code does not do this then a mark of zero may be awarded. If your code from the Labs does not work then you can use the Lab Solutions provided on Canvas (include these files in the upload instead of your own).