Numerical Methods 35006
Computer Lab 2: 1D Minimisation

Go through each of the tasks in order. If you're stuck then ask the person sitting next to you - if you're both stuck then put your hand up and someone will come and help.

1. Write a *script* for bracketing all the minima of the following function:

$$f(x) = x\cos(x) + x\sin(x/2)$$

in the range $x \in [-10, 10]$.

2. a) Turn the script above into a *function* called `minbracket`, which is called as follows:

```
import numpy as np
def f(x):
        f = x*np.cos(x) + x*np.sin(x/2)
        return f
a = -5
b = 5
N = 20
blist = minbracket(f,a,b,N)
```

   b) Add code to the script above to print out a list of all the bracketing intervals.

3. Write a golden search procedure to find all the minima of the function and range given in Q1 to within a tolerance of 10^{-5}.

4. Create a function out of your golden search procedure. Using this and the bracketing function from Q2, find all the minima of

$$f(x) = x^2 + x\sin(x^2)$$

in the range $x \in [1, 5]$.

5. Take each of your search routines and incorporate them into your `mysearch.py` module.