PLEASE NOTE: Before you start remove any flash memory devices from the PC. Failure to unplug flash memory devices may result in an F grade.

Please include your name at the top of each .cpp and upload to Moodle.

Note: You should write only one main program, which includes all the functionality you have been asked for to test your implementation.

1. Develop two template functions, firstly **a template function for the recursive version of the QuickSort algorithm.** This quicksort function should use a second **template function called partition.** The partition function can use the STL function `swap()` to switch two elements in the array (see swap example at end of sheet).

2. Your functions will have the following declarations.

```
template<typename T>
void quickSort(T[], int, int);
```
[30 marks]

```
template<typename T>
int partition(T[], int, int);
```
[30 marks]

Code a main program that tests your quicksort function by sorting an array of integers and then doubles. **[20 marks]**

Further 20 marks for good coding practice, e.g. clear well-presented code, well-chosen variable and class names and appropriate comments – if you don't put your name on the file you may lose these.

To use `swap()` you will need to `#include <utility>`. Swap has the following definition: `template< class T2, std::size_t N >`
`void swap( T2 (&a)[N], T2 (&b)[N])`

example:

```
#include <utility>
#include <iostream>

int main()
{
   int a = 5, b = 3;
   cout << a << ' ' << b << '\n';   // before
   swap(a,b);
   cout << a << ' ' << b << '\n';   // after
}
```

Output:

5 3
3 5