DIVIDE AND CONQUER II

Question 1

Provide an implementation of a function that multiplies 2 numbers digit by digit (multiply4) that runs in $O(N^2)$ time, and using Karatsuba's algorithm (multiply3) that runs in $\approx O(N^{1.585})$ time.

(a) Compare the time required to multiply the strings using the obvious method (with 4 sub-problems), with the method of Karatsuba (that results in 3 sub-problems). You may choose your own example strings and vary their length to get a sense of how the 2 alternatives behave.

An example of what your driver code should look like in your main function follows.

```
// You might include code for timing in here too, or elsewhere
int main()
{
    printf ("%ld\n", multiply4("1234", "4321"));
    printf ("%ld\n", multiply3("1234", "4321"));

    printf ("%ld\n", multiply4("110", "220"));
    printf ("%ld\n", multiply3("110", "220"));

    printf ("%ld\n", multiply4("14589", "912"));
    printf ("%ld\n", multiply3("14589", "912"));

    printf ("%ld\n", multiply4("7777777", "88888888"));
    printf ("%ld\n", multiply3("7777777", "88888888"));
}
```

You should submit your solution to the D2L Dropbox for Lab 3. Please name your CPP file according to the scheme lastname_firstname_lab3.cpp.

Here you will replace lastname and firstname with your own name.