Practical – Assembly Language

Configure Visual studio for MASM and implement the following basic programs by following the instructions in the resources provided on Canvas:

- Setting up Visual Studio for x86 Assembly language Programming.pdf
- Watch the video – "How to use Visual Studio for x86 Assembly Programming"

Part 1 - Arithmetic

Write the following C program in assembly language.

```
int a = 11;
int b = 3;
a = a + b;
a = a – b;
a--;
b++;
a = a * 2;
b = a % 3;
```

Here is some code to initialise the variables a and b:

```
main PROC
; write your assembly code here
mov dword ptr [ebp-4], 11 ; int a = 11
mov dword ptr [ebp-8], 3  ; int b = 3
```

Part 2 – Nested IF statements

Write the following C program in assembly language.

What is the final value for z?

Experiment with different values for x, y and z so that all paths are covered.

```
int x = 0;
int y = 1;
int z = 2;

if (x == y){
    if(z == 0){
        z=y+z;
    }else{
        z=y-z;
    }
}else{
    if(z == 0){
        z=x+z;
    }else{
        z=x-z;
    }
}
```

When implementing jump statements you need to provide a label.

For example, `jmp l1` will result in the program jumping to the line labelled `l1` e.g.

```
jmp l1

…

l1: # code jumps to here
```

See lecture notes for more examples.

Part 3 – For loops

Implement the following C program in assembly language.

What is the final value of j?

```
int i;
int j=0;

for (i = 0; i < 10; i++)
{
    j=j+i;
}
```

Part 4 – While Loops

Implement the following C program in assembly language.

What is the final value of p?

```
int p = 2;
int r = 3;
int n = 5;
int y = 1;

while (y <= n)
{
    p = p*(1+r);
    y++;
}
```