COMP1036 Computer Fundamentals
Lab 2

You are required to implement the following logic circuits using only NAND gate and any other gates you have previously implemented. Therefore, you need to implement the circuits in the **following order**:

1. NOT
2. AND
3. OR
4. XOR
5. Mux
6. DMux
7. Not16

   ```
   16-bit Not gate: for i = 0..15: out[i] = Not in[i]
   ```

8. And16

   ```
   16-bit-wise And gate: for i = 0..15: out[i] = a[i] And b[i]
   ```

9. Or16

   ```
   16-bit bitwise Or gate: for i = 0..15 out[i] = a[i] Or b[i]
   ```

10. Mux16

    ```
    16-bit multiplexor. If sel == 1 then out = b else out = a
    ```

11. Or8Way

    ```
    8-way Or gate: out = in[0] Or in[1] Or ... Or in[7]
    ```

12. Mux4Way16

    ```
    4-way 16-bit multiplexor.
    out = a if sel == 00
    out = b if sel == 01
    out = c if sel == 10
    out = d if sel == 11
    ```

13. Mux8Way16

```
8-way 16-bit multiplexor.
out = a if sel == 000
out = b if sel == 001
out = c if sel == 010
out = d if sel == 011
out = e if sel == 100
out = f if sel == 101
out = g if sel == 110
out = h if sel == 111
```

14. DMux4Way

```
4-way demultiplexor.
{a,b,c,d} = {in,0,0,0} if sel == 00
{a,b,c,d} = {0,in,0,0} if sel == 01
{a,b,c,d} = {0,0,in,0} if sel == 10
{a,b,c,d} = {0,0,0,in} if sel == 11
```

15. DMux8Way

```
8-way demultiplexor.
{a,b,c,d,e,f,g,h} = {in,0,0,0,0,0,0,0} if sel == 000
{a,b,c,d,e,f,g,h} = {0,in,0,0,0,0,0,0} if sel == 001
{a,b,c,d,e,f,g,h} = {0,0,in,0,0,0,0,0} if sel == 010
{a,b,c,d,e,f,g,h} = {0,0,0,in,0,0,0,0} if sel == 011
{a,b,c,d,e,f,g,h} = {0,0,0,0,in,0,0,0} if sel == 100
{a,b,c,d,e,f,g,h} = {0,0,0,0,0,in,0,0} if sel == 101
{a,b,c,d,e,f,g,h} = {0,0,0,0,0,0,in,0} if sel == 110
{a,b,c,d,e,f,g,h} = {0,0,0,0,0,0,0,in} if sel == 111
```