

Tutorial 8 Week 9

1. Find simple switching circuits corresponding to the following Boolean functions:

| (i) | x | y | z | $f(x, y, z)$ | (ii) | x | y | z | $f(x, y, z)$ |
|-----|-----|-----|-----|--------------|------|-----|-----|-----|--------------|
| | 1 | 1 | 1 | 0 | | 1 | 1 | 1 | 1 |
| | 1 | 1 | 0 | 1 | | 1 | 1 | 0 | 1 |
| | 1 | 0 | 1 | 1 | | 1 | 0 | 1 | 0 |
| | 1 | 0 | 0 | 1 | | 1 | 0 | 0 | 0 |
| | 0 | 1 | 1 | 1 | | 0 | 1 | 1 | 1 |
| | 0 | 1 | 0 | 1 | | 0 | 1 | 0 | 1 |
| | 0 | 0 | 1 | 0 | | 0 | 0 | 1 | 1 |
| | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |

2. For the following Karnaugh maps write down corresponding (simple) Boolean expressions.

| (i) | yz | yz' | $y'z'$ | $y'z$ | (ii) | yz | yz' | $y'z'$ | $y'z$ |
|------|------|-------|--------|-------|------|------|-------|--------|-------|
| x | 1 | 1 | 1 | 1 | x | 1 | 0 | 1 | 1 |
| x' | 1 | 0 | 0 | 1 | x' | 1 | 1 | 0 | 1 |

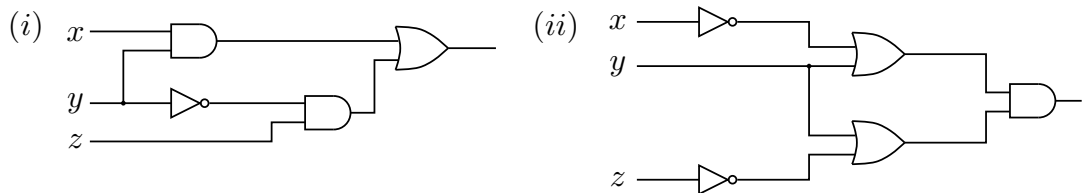
3. For the following Karnaugh maps write down corresponding (simple) Boolean expressions.

| (i) | yz | yz' | $y'z'$ | $y'z$ | (ii) | yz | yz' | $y'z'$ | $y'z$ |
|--------|------|-------|--------|-------|--------|------|-------|--------|-------|
| wx | 1 | 1 | 1 | 0 | wx | 0 | 1 | 0 | 0 |
| wx' | 0 | 1 | 1 | 1 | wx' | 0 | 1 | 1 | 1 |
| $w'x'$ | 1 | 1 | 1 | 1 | $w'x'$ | 1 | 1 | 1 | 0 |
| $w'x$ | 1 | 1 | 1 | 0 | $w'x$ | 0 | 1 | 1 | 0 |

4. Using AND and OR gates and inverters, draw digital logic circuits for the following Boolean expressions:

(i) $xy \vee x'$. (ii) $(x' \vee y)(x \vee y')$. (iii) $xyz' \vee z$.

5. Write down Boolean expressions corresponding to the following logic circuits.



Problem Set 8

1. For each of the following two Boolean functions:

| (i) | x | y | z | $f(x, y, z)$ | (ii) | x | y | z | $f(x, y, z)$ |
|-----|-----|-----|-----|--------------|------|-----|-----|-----|--------------|
| | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 |
| | 1 | 1 | 0 | 0 | | 1 | 1 | 0 | 1 |
| | 1 | 0 | 1 | 1 | | 1 | 0 | 1 | 1 |
| | 1 | 0 | 0 | 0 | | 1 | 0 | 0 | 0 |
| | 0 | 1 | 1 | 1 | | 0 | 1 | 1 | 0 |
| | 0 | 1 | 0 | 0 | | 0 | 1 | 0 | 0 |
| | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | 1 |
| | 0 | 0 | 0 | 1 | | 0 | 0 | 0 | 0 |

- (a) write down the corresponding Boolean expression in its disjunctive normal form;
- (b) using the Karnaugh map method, write down the simple Boolean expression.
- (c) draw the switching circuit for the simple Boolean expression in (b);
- (d) draw the digital logic circuit, using AND and OR gates and inverters for the simple Boolean expression in (b);

2. Find a simple switching circuit and a simple digital logic circuit corresponding to each of the following two Boolean functions:

| (i) | x | y | z | $f(x, y, z)$ | (ii) | w | x | y | z | $f(x, y, z, w)$ |
|-----|-----|-----|-----|--------------|------|-----|-----|-----|-----|-----------------|
| | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 |
| | 1 | 1 | 0 | 1 | | 1 | 1 | 1 | 0 | 1 |
| | 1 | 0 | 1 | 1 | | 1 | 1 | 0 | 1 | 1 |
| | 1 | 0 | 0 | 1 | | 1 | 1 | 0 | 0 | 1 |
| | 0 | 1 | 1 | 0 | | 1 | 0 | 1 | 1 | 0 |
| | 0 | 1 | 0 | 1 | | 1 | 0 | 1 | 0 | 1 |
| | 0 | 0 | 1 | 0 | | 1 | 0 | 0 | 1 | 0 |
| | 0 | 0 | 0 | 0 | | 1 | 0 | 0 | 0 | 1 |
| | | | | | | 0 | 1 | 1 | 1 | 0 |
| | | | | | | 0 | 1 | 1 | 0 | 0 |
| | | | | | | 0 | 1 | 0 | 1 | 0 |
| | | | | | | 0 | 1 | 0 | 0 | 0 |
| | | | | | | 0 | 0 | 1 | 1 | 0 |
| | | | | | | 0 | 0 | 1 | 0 | 1 |
| | | | | | | 0 | 0 | 0 | 1 | 0 |
| | | | | | | 0 | 0 | 0 | 0 | 1 |