

EE 2310 Homework #2 – Binary Codes, Boolean Algebra, and Basic Digital Circuits – Solutions

1. Convert the following decimal numbers to BCD:

56 0101 0110 81.3 1000 0001.0011 95 1001 0101 72 0111 0010

38 0011 1000 24 0010 0100 61.4 0110 0001.0100 40 0100 0000

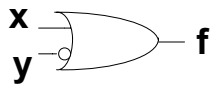
2. Convert the following BCD-coded binary numbers to decimal. Put “NA” if the number is not a correctly coded BCD number:

1100 1101 NA 0101 0010 52 1111 0110 NA 1001 0101 95

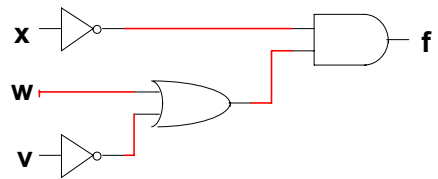
0100 0010 42 0010 0111 27 0011 0100 34 0001 1000 18

3. Draw the simple logic circuit for each of the following Boolean expressions:

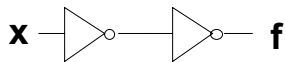
$$f = x + \bar{y}$$



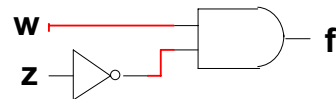
$$f = \bar{x} \cdot (w + \bar{v})$$



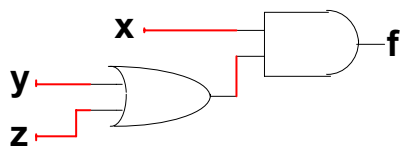
$$f = \bar{\bar{x}}$$



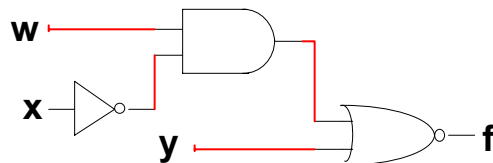
$$f = w \cdot \bar{z}$$



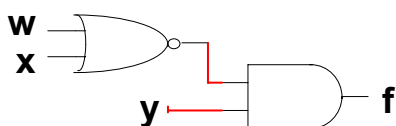
$$f = x \cdot (y + z)$$



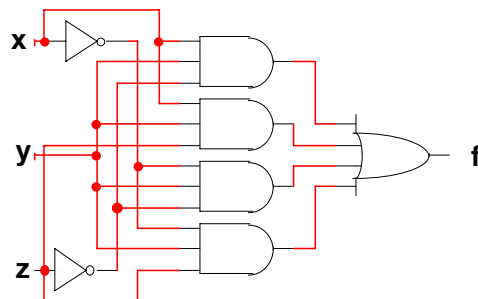
$$f = \overline{(w \cdot \bar{x}) + y}$$



$$f = \overline{(w + x)} \cdot y$$



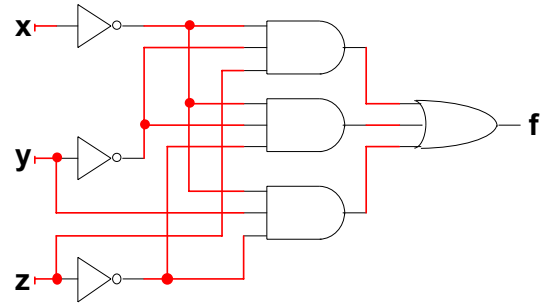
$$f = \bar{x}y\bar{z} + x\bar{y}z + \bar{x}y\bar{z} + \bar{x}y\bar{z}$$



4. Given the truth table below, write its Boolean expression in SOP form. Then draw the logic circuit that represents the Boolean expression.

x	y	z	f
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

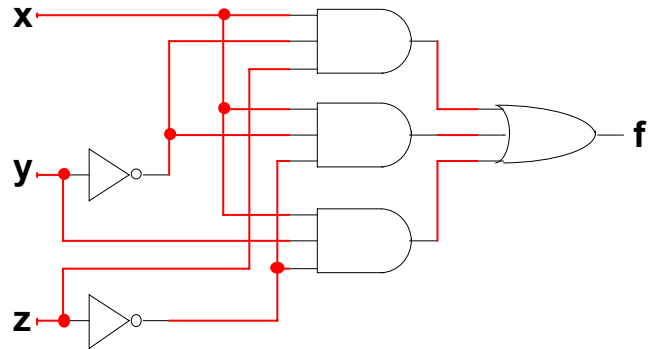
$$f = \overline{\overline{x}}\overline{\overline{y}}\overline{\overline{z}} + \overline{\overline{x}}\overline{\overline{y}}z + \overline{\overline{x}}\overline{\overline{y}}\overline{\overline{z}}$$



5. For the SOP Boolean expression given, fill in the truth table below. Then draw the logic circuit that represents the Boolean expression.

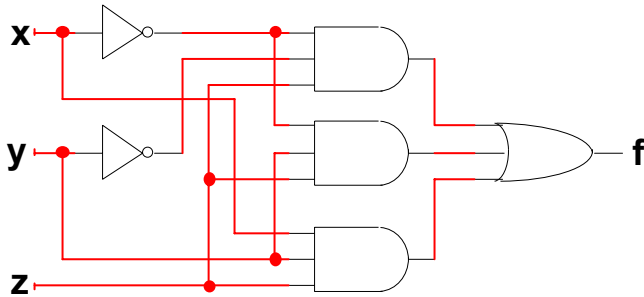
$$f = \overline{x}yz + \overline{x}y\overline{z} + x\overline{y}z$$

x	y	z	f
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0



6. For the logic circuit below, write its Boolean expression in SOP form. Then fill in the truth table for the Boolean expression and the circuit.

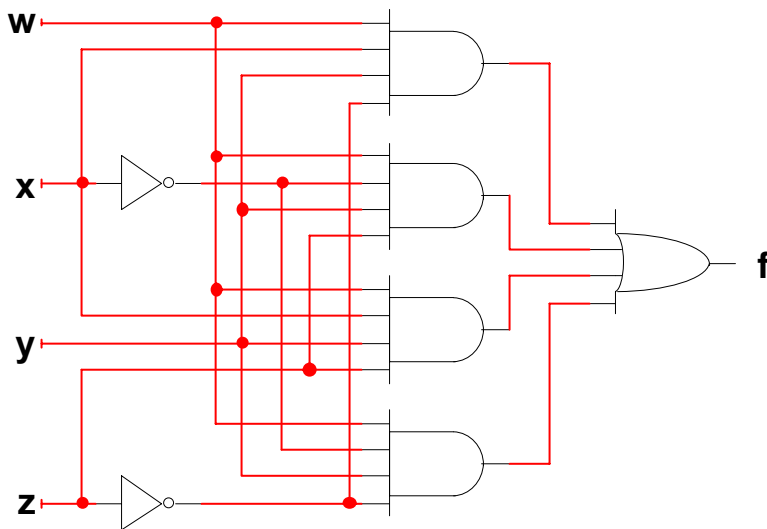
$$f = \overline{\overline{x}} \overline{y} z + \overline{x} y z + x y z$$



x	y	z	f
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

7. For the logic circuit below, write its Boolean expression in SOP form. Then fill in the truth table for the Boolean expression and the circuit.

$$f = w x y z + w \overline{x} y z + w x y \overline{z} + w \overline{x} y \overline{z}$$



w	x	y	z	f
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	1
1	1	1	1	1