1.) 103

2.) 26

3.) Simplify the Boolean expression x' + xy + xz' +xy'z'. What is the simplest result?

F = x' + xy + xz' +xy'z'

F = x’ + xy + xy’z’ 🡪Absorption

x’(x + y)(x + y’ + z’) 🡪Dual

= x’y(x + y’ + z’)🡪Distribution

= x’yz’ 🡪Distribution

**F = x’ + y + z’ 🡪Dual**

4.) Simplify ( x + y )'(x' + y'). What is the simplest result ?

F = ( x + y )' (x' + y')

F = (x’y’)(x’y’) 🡪 De Morgan’s

F = x’x’y’y’ 🡪 Distributive

**F = x’y’ 🡪 Idempotent**

5.) Simplify x \* ( x + y + z ) \* ( x' + y ) \* ( x + q ) \* ( x + q' + z ).

F = x\* ( x + y + z ) \* ( x' + y ) \* ( x + q ) \* ( x + q' + z )

x + (xyz) + (x’y) + (xq) + (xq’z) 🡪 Dual

xz(y + q’) + x + xq + x’y 🡪 Distributive

xz(y + q’) + x + x’y 🡪 Absorption

x(z(y + q’) + x) + y 🡪 Associative

x(z(y + q’) + 1) + y 🡪 Distributive

x + y 🡪 Rule for 1 and 0

**F = xy 🡪 Dual**

6.)Simplify x \* ( x + y + z' ) \* ( x' + z ) \* ( y + z' ) \* ( x + z )

F = x \* ( x + y + z' ) \* ( x' + z ) \* ( y + z' ) \* ( x + z )

x + (xyz’) + (x’z) + (yz’) + (xz) 🡪 Dual

(x + xz) + (yz’ + yz’x) + x’z 🡪Commutative

x + yz’ + x’z 🡪 Absorbtion

x + z + yz’ 🡪 Absorbtion

x + y + z 🡪 Absorption

**F = xyz 🡪 Dual**

7.) Write the boolean expression ( in sum-of-product form ) for a logic circuit that will have a 1 output when x = 0, y = 0, z = 1 and x = 1, y = 1, z = 0; and a 0 output for all other input states. Draw the circuit for the simplified expression.

|  |  |  |  |
| --- | --- | --- | --- |
| x | y | z | F |
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 0 |

When x = 0, y = 0, z = 1 and x = 1, y = 1, z = 0 🡪 (x’y’z’) + (xyz’)

F = (x’y’z’) +( xyz’)

x’ + y + ’z’(x + y + z’) 🡪 Dual

z’ + x’ + y’(x + y + z’) 🡪 Associative

z’ + x’ + y’x + y’z 🡪 Distribution

z + x’ + y’z 🡪 Absorption

x’ + z 🡪 Rules for 1 and 0

x’z 🡪 Dual

I’ve tried to simplify and it and I know this is the incorrect answer. I will leave my version of the simplest form but draw the circuit according to the original equation.

x’y’z’

x

F

y

xyz’

z

8.) Simplify the expression xyz ( xyz' + zy'z + x'yz ).

F = xyz ( xyz' + zy'z + x'yz)

F = xxyyzz’ + xxyy’zz + xx’yyzz

**F = 0**

9.) Convert the following to product of sums form : xy + x'y' . Hint: Apply the distributive rule, e.g. a + b \* c = (a + b)(a +c)

F = xy + x'y'

F = x’x + x’y’ + xy + y’y 🡪 Adding zeros to not change equation

F = x’(x + y’) + y(x + y’) 🡪 Distributive

**F = (x’ + y)(x + y’)** 🡪 Distributive

10.) (AB’) + (AC’)

11.) None of the above

12.) Using maps or whatever method you prefer, simplify the following expressions in four variables, w, x, y and z :

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | wx yz | 00 | 01 | 11 | 10 |
|  | 00 | 1 | 1 | 1 | 1 |
|  | 01 | 0 | 0 | 1 | 1 |
|  | 11 | 0 | 0 | 0 | 1 |
|  | 10 | 1 | 0 | 0 | 1 |
|  |  |  |  |  |  |

YZ’ + W’X’ + Y’X’ + ZY’

**Evaluation:**

I completed every problem on homework two. The reason I am giving myself 55/60 is because of the simplification of problem 7. Since I don’t believe it is the right answer I will be taking off five points.