210 Assignment1 Wyatt Bushman

1. X + ( X’ Y + X Y )’ = X + Y’

Work:

X + ( X’ Y + X Y )’

X + (Y(X’+X))’

X + (Y(1))’

X + (Y)’

X + Y’

1. (( X Y ) Z ) + ( Y Z ) = Y Z

Work:

((XY)Z) + (YZ)

(XYZ + YZ) absorption law cancels XYZ by matching YZ

YZ

1. c. X’ Y = X’ Y + X’ Y Z

Work:

X’ Y + X’ Y Z

X’Y absorption law cancels X’YZ by matching X’Y

2.

First find all the outputs of 1’s

D = X’Y’Z + X’YZ’ + XY’Z’ + XYZ

B = X’Y’Z + X’YZ’ + X’YZ + XYZ

D work:

X’Y’Z + X’YZ’ + XY’Z’ + XYZ

X’(Y’Z+YZ’)+X(Y’Z’+YZ)

X’(Y XOR Z) + X(1)

X’(Y XOR Z) + X

X’+X(Y XOR Z)

(1)(Y XOR Z)

(Y XOR Z)

B work:

X’Y’Z + X’YZ’ + X’YZ + XYZ

X’(Y’Z+YZ’)+YZ(X’+X)

X’(Y XOR Z) + YZ(1)

X’(Y XOR Z) + YZ

3.

a. (A\*B\*B’\*C)’ = 1

b. ((A’C)’ \* (B’C)’)’ = C\*(A’+B’)

c. A’C \* B’C = 0

d. A’B+AC’D+AB’C

e. A’D’+BC+D’B

4.

Output:

AB\*(F0’\*F1’) + (A+B) \* (F0’\*F1) + B’ \* (F0\*F1’) + C XOR (A XOR B) \* F0F1

When:

F0’\*F1 = AB is the output

F0’\*F1 = A+B is the output

F0\*F1’ = B’ is the output

F0\*F1 = C XOR (A XOR B) is the output

Carryout:

F0\*F1 \* A \* B + C \* (A XOR B) \* F0\*F1

When:

F0\*F1 = A\*B OR C\*(A XOR B) is the carry out

Image:

Diagram, schematic

Description automatically generated

AB(F0’F1’) + (A+B) \* (F0’F1) + B’ \* (F0F1’) + C XOR (A XOR B) \* F0F1

C XOR (A XOR B) \* F0\*F1

C XOR A XOR B

(F0\*F1) A \* B + C \* (A XOR B) \* (F0\*F1)

+C \* (A XOR B) \* (F0\*F1)

C \* (A XOR B) \* (F0\*F1)

(F0\*F1) A \* B

A XOR B

F0 \* F1

F0 \* F1’

F0’ \* F1

F0’ \* F1’

F1’

F0’

F1’

F0’

B’ \* (F0 \* F1’)

(A+B) \* (F0’ \* F1)

AB\*(F0’ \* F1’)

B’

A+B

AB

Rationale, there will be 4 possible combinations because of the decoder with 2 values F0 and F1 because 2^N. If there was 3 inputs eg an F2, it would be 8 combinations.