

Problem Set #1[← Back](#)

Graded Assignment • 1h



English ▾

Due May 12, 11:59 PM PDT**1. Problem 1: Working with Shannon Cofactors****5 points**

Let Boolean function $F(x, y, z, w) = (xy + \bar{x}z) \oplus w$.

Tell us whether each of the following Boolean equations involving Shannon Cofactors of function $F(\)$ are true or false. Please select all correct answers.

(Reminder: $a \oplus b = a\bar{b} + \bar{a}b$; think carefully about what equations like (Boolean stuff) $\oplus 1$ and (Boolean stuff) $\oplus 0$ can simplify to.)

☒ $F_y = (x + \bar{x}z) \oplus w$

☐ $F_w = (\bar{x}\bar{z} + x\bar{y} + \bar{y}\bar{z})$

☒ $F_{\bar{y}} = (x + \bar{x}z) \oplus w$

2. Problem 1: Working with shannon cofactors - 2**5 points**

This question is a continuation of Problem 1.

☒ $F_{xy} = \bar{w}$

☐ $F_{xy} = w$

3. Problem 2: Alternative Shannon Expansion Formulas**8 points**

There are other ways of representing the Shannon Expansion theorem. The version we gave you –

$F(x_1, \dots, x_i, \dots, x_n) = x_i \bullet F(x_i = 1) + \bar{x}_i \bullet F(x_i = 0)$ can be thought of as a “sum of products” form, since the equation is an OR (sum) of two small AND (product) terms. But there must be a “product of sums” form for the Shannon expansion. And perhaps even other forms that use Boolean algebra to express this idea in a different way.

Use Boolean algebra, and the basic properties of cofactors, and tell us which of these equations is a correct alternate form of the Shannon Expansion. Please select all correct answers.

(Hint: when it doubt, it is always a good idea to just make up a little Boolean