**Name:**

1. (6 pts) For the following truth function,

| $x_1$ | $x_2$ | $x_3$ | $f(x_1, x_2, x_3)$ |
|---|---|---|---|
| 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 1 |
| 1 | 0 | 1 | 1 |
| 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 1 |

   a. (2 pts) Write the canonical sum-of-products form for the truth function.

   b. (4 pts) Draw the logic network for the canonical sum-of-products.

2. (4 pts)

a. Are the two Boolean expressions

$$f_1(x_1, x_2, x_3) = (x_1 + x_2)(x_1' + x_3)(x_2 + x_3)$$

and

$$f_2(x_1, x_2, x_3) = (x_1 x_3) + (x_1' x_2)$$

equivalent? To decide, compute the truth table **for each**.

| $x_1$ | $x_2$ | $x_3$ | $f_1(x_1, x_2, x_3)$ |
|---|---|---|---|
| 1 | 1 | 1 | |
| 1 | 1 | 0 | |
| 1 | 0 | 1 | |
| 1 | 0 | 0 | |
| 0 | 1 | 1 | |
| 0 | 1 | 0 | |
| 0 | 0 | 1 | |
| 0 | 0 | 0 | |

| $x_1$ | $x_2$ | $x_3$ | $f_2(x_1, x_2, x_3)$ |
|---|---|---|---|
| 1 | 1 | 1 | |
| 1 | 1 | 0 | |
| 1 | 0 | 1 | |
| 1 | 0 | 0 | |
| 0 | 1 | 1 | |
| 0 | 1 | 0 | |
| 0 | 0 | 1 | |
| 0 | 0 | 0 | |

b. If they are equivalent, use properties of Boolean algebra to reduce one of the expressions of part (a) to the other; otherwise, identify the rows in which they differ.