Introduction to Computer Science

**Problem Sheet #9**

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Problem 9.1:

a)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X2 | X1 | X0 | a | b | c | d | e | f |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |

b)

= (¬ X2 ∨ X0) ∨ (X2) ∨ (¬X2 ∨ X1) ∨ (X2) ∨ (¬X2 ∨ X1) ∨ (X2) ∨ (X2 ∧ ¬X1 ∧ X0) ∨ (X2 ∧ X1 ∧ ¬X0) ∨ (X2 ∧ ¬X0) ∨ (X2 ∧ ¬X1 ∧ X0) ∨ (X2 ∧ X1 ∧ ¬X0)

= (X2 ∨ X0) ∨ (X2 ∨ X1) ∨ (X2 ∨ X1) ∨ (X2((¬X1 ∧ X0) ∨ (X1 ∧ ¬X0))) ∨ (X2 ∧ ¬X0) ∨ (X2 ∧ ((¬X1 ∧ X0) ∨ (X1 ∧ ¬X0)))

= (X2 ∨ X0) ∨ (X2 ∨ X1) ∨ (X2 ∨ X1) ∨ (X2 ∧ (X1 ∨ X0)) ∨ (X2 ∧ ¬X0) ∨ (X2 ∧ (X1 ∨ X0))

For Outputs:

a = (X2 ∨ X0)

b = (X2 ∨ X1)

c = (X2 ∨ X1)

d = X2 ∧ ((¬X1 ∧ X0) ∨ (X1 ∧ ¬X0))

= X2 ∧ (X1 ∨ X0)

e = (X2 ∧ ¬X0)

f = X2 ∧ ((¬X1 ∧ X0) ∨ (X1 ∧ ¬X0))

= X2 ∧ (X1 ∨ X0)

c) <http://simulator.io/board/LjiM28faaB/3>

Problem 9.3:

**foldl (/) 50 [4,2,5]**

Evaluation:

= (((50/4)/2)/5)

**Step 1:** 50 divided by 4 = 12.5

**Step 2:** 12.5 divided by 2 = 6.25

**Step 3:** 6.25 divided by 5 = 1.25

**foldr (/) 50 [4,2,5]**

Evaluation:

= 4/(2/(5/50))

**Step 1:** 5 divided by 50 = 0.1

**Step 2:** 2 divided by 0.1 = 20

**Step 3:** 4 divided by 20 = 0.2

Output: 0.2