Introduction to Computer Science
Problem Sheet #9
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Problem 9.1:

a)

X_2	X_1	X_0	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)
$= (\neg X_2 \vee X_0) \vee (X_2) \vee (\neg X_2 \vee X_1) \vee (X_2) \vee (\neg X_2 \vee X_1) \vee (X_2) \vee (X_2 \wedge \neg X_1 \wedge X_0) \vee (X_2 \wedge X_1 \wedge \neg X_0) \vee (X_2 \wedge \neg X_0) \vee (X_2 \wedge \neg X_1 \wedge X_0) \vee (X_2 \wedge X_1 \wedge \neg X_0)$

$= (X_2 \vee X_0) \vee (X_2 \vee X_1) \vee (X_2 \vee X_1) \vee (X_2((\neg X_1 \wedge X_0) \vee (X_1 \wedge \neg X_0))) \vee (X_2 \wedge \neg X_0) \vee (X_2 \wedge ((\neg X_1 \wedge X_0) \vee (X_1 \wedge \neg X_0)))$

$= (X_2 \vee X_0) \vee (X_2 \vee X_1) \vee (X_2 \vee X_1) \vee (X_2 \wedge (X_1 \vee X_0)) \vee (X_2 \wedge \neg X_0) \vee (X_2 \wedge (X_1 \vee X_0))$

For Outputs:

$a = (X_2 \vee X_0)$

$b = (X_2 \vee X_1)$

$c = (X_2 \vee X_1)$

$d = X_2 \wedge ((\neg X_1 \wedge X_0) \vee (X_1 \wedge \neg X_0))$
$= X_2 \wedge (X_1 \vee X_0)$

$e = (X_2 \wedge \neg X_0)$

$f = X_2 \wedge ((\neg X_1 \wedge X_0) \vee (X_1 \wedge \neg X_0))$
$= X_2 \wedge (X_1 \vee X_0)$

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