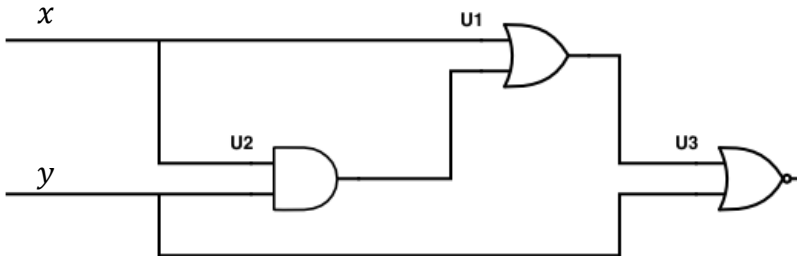


9/21/15

Don't Cares



1. Observability Don't Cares:

For which settings of x, y does the output of U1 “not matter” for the final output of the circuit?

When $y = 1$, the output of U1 does not matter, since the output of U3 will always be 0.

2. Satisfiability Don't Cares:

Which setting of the input wires to U1 cannot occur?

Top wire = 0 and bottom wire = 1 can never occur, since top wire is x , bottom wire is xy .

Universal Gates

1. Prove that the 3-input gate $f(x, y, z) = x\bar{y}z + x + y\bar{z}$ is universal.

$$\begin{aligned} \text{Not}(x) &= f(0, 1, x) \\ \text{OR}(x, y) &= f(x, y, 0) \\ \text{AND}(x, y) &= f(0, x, \bar{y}) = f(0, x, f(0, 1, y)) \end{aligned}$$