Digital Logic

$B = \{0, 1\}$

0 and 1 are the identity

$0 + x = x$

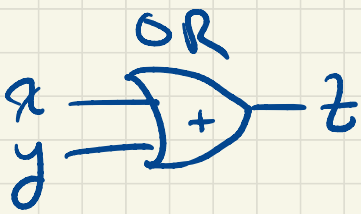
$1 \cdot x = x$

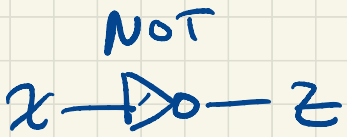
$x \cdot y$	$\cdot$
0 0	0
0 1	0
1 0	0
1 1	1

$x + y$	$+$
0 0	0
0 1	1
1 0	1
1 1	1

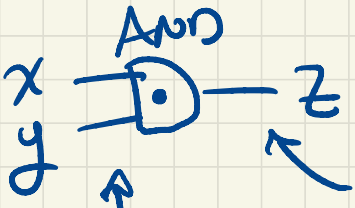
x'	
0	1
1	0

Digital Circuit



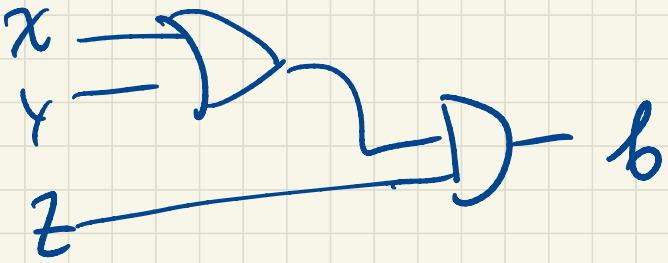


GATES

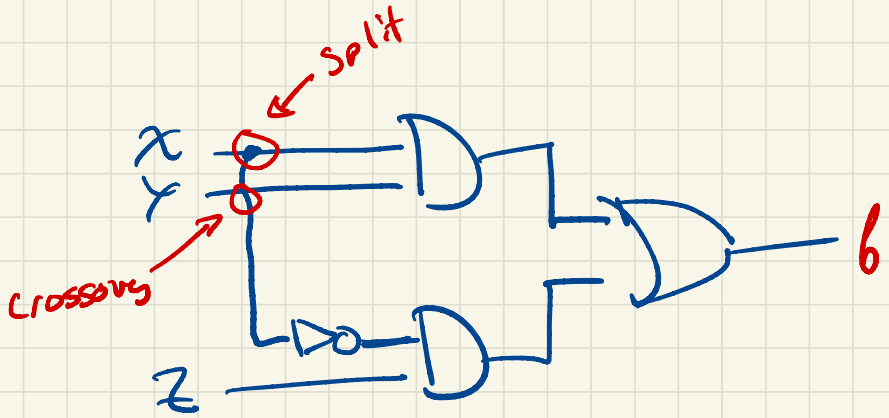


wires as output

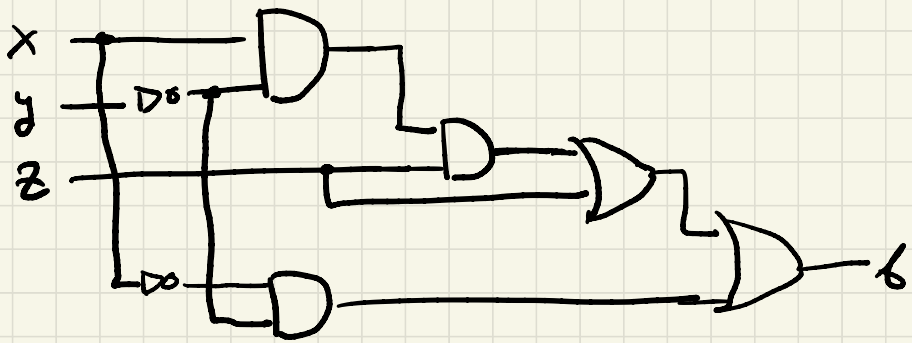
wires input

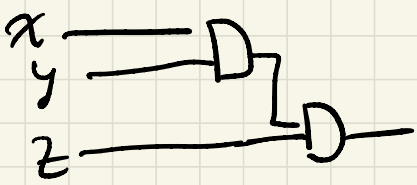


$$b = (x + y) \cdot z$$

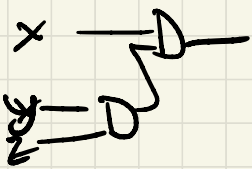


$$b(x,y,z) = xy + x'z$$

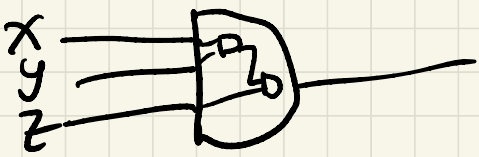


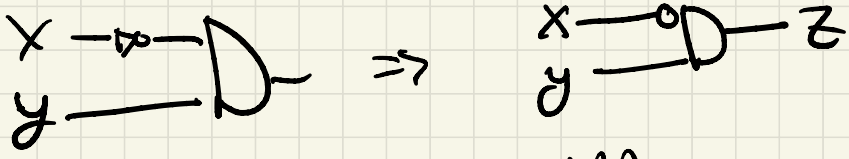


(xy)z

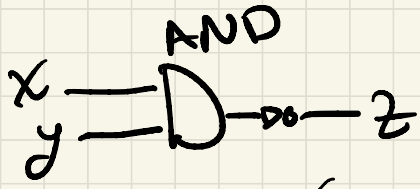


x(yz)

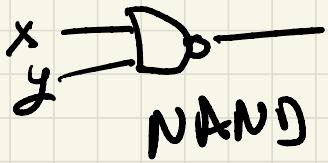




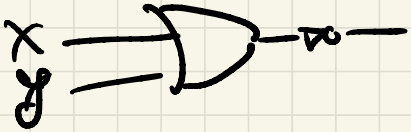
Bubbles

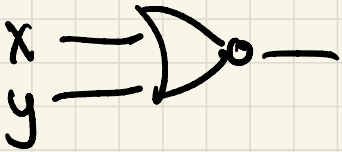


$(xy)'$



X	Y	NAND
0	0	1
0	1	1
1	0	1
1	1	0

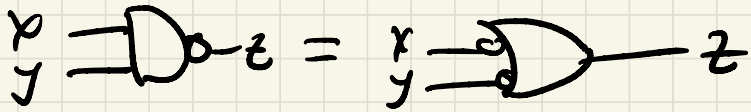


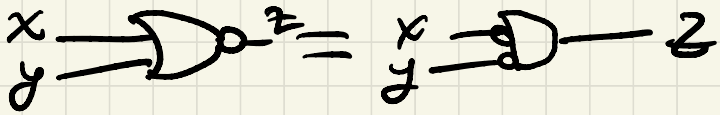


X	Y	NOR
0	0	1
0	1	0
1	0	0
1	1	0

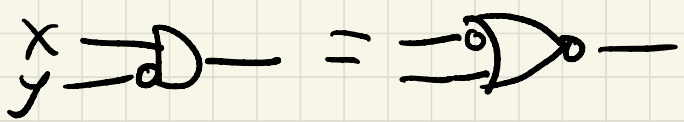
$$(x+y)' = x'y'$$

$$(xy)' = x' + y'$$

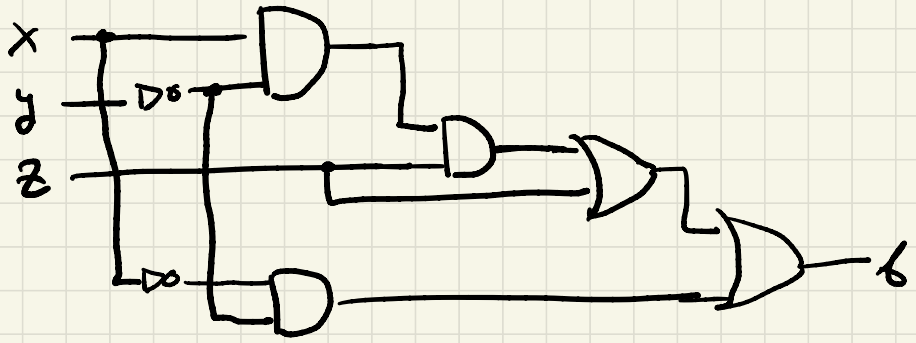


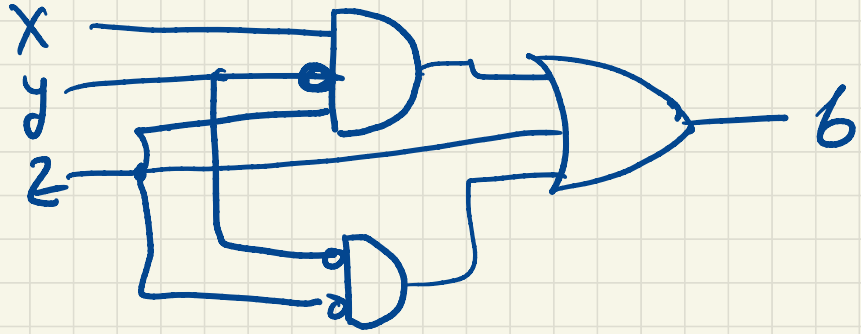


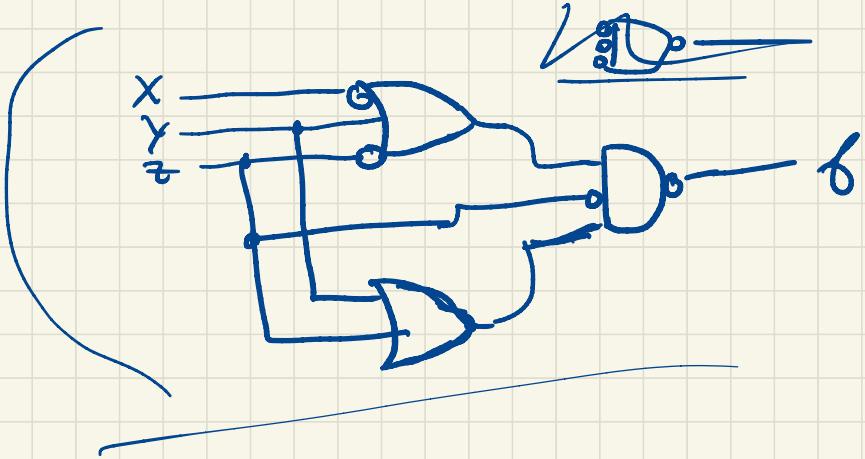
Bubble pushing



Visualizing DeMorgan's Law


x
y
z
b


x
y
z
b


x
y
z
b