Example 2.1 MM 5ed

- Simplify the boolean functions:

1. $x(x' + y)$
2. $x + x'y$
3. $(x + y)(x + y')$
4. $xy + x'z + yz$
5. $(x + y)(x' + z)(y + z)$

Postulate 2	(a)	$x + 0 = x$	(b)	$x \cdot 1 = x$
Postulate 5	(a)	$x + x' = 1$	(b)	$x \cdot x' = 0$
Theorem 1	(a)	$x + x = x$	(b)	$x \cdot x = x$
Theorem 2	(a)	$x + 1 = 1$	(b)	$x \cdot 0 = 0$
Theorem 3, involution		$(x')' = x$		
Postulate 3, commutative	(a)	$x + y = y + x$	(b)	$xy = yx$
Theorem 4, associative	(a)	$x + (y + z) = (x + y) + z$	(b)	$x(yz) = (xy)z$
Postulate 4, distributive	(a)	$x(y + z) = xy + xz$	(b)	$x + yz = (x + y)(x + z)$
Theorem 5, DeMorgan	(a)	$(x + y)' = x'y'$	(b)	$(xy)' = x' + y'$
Theorem 6, absorption	(a)	$x + xy = x$	(b)	$x(x + y) = x$

$x(x' + y)$

$x \cdot x' + xy$

$0 \quad \underline{xy}$

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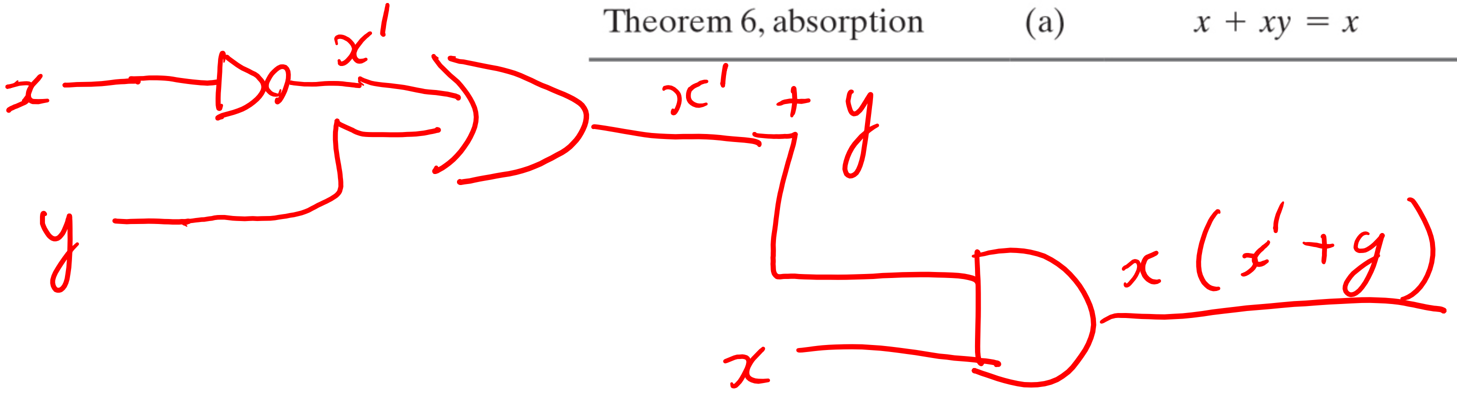

2 gates

$x + x'y$

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

$1(x + y)$

$x + y$

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$x + y = 2$

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

$(x+y)\cdot x + (x+y)\cdot y'$

$\underline{x\cdot x + x\cdot y + y'\cdot x + y'\cdot y}$

$x + y'\cdot x + \cancel{y'\cdot y}\ 0$

$x + y'\cdot x$

$\Downarrow$

x

$x + \underbrace{xy + y'\cdot x}$

$x + x(y + y')$

$x + x(1)$

$\Downarrow$

x

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$xy + x'z + yz$

$xy + x'z + yz(x + x')$

$xy + x'z + xyz + x'yz$

$xy(\underbrace{1 + z}_{1}) + x'z(\underbrace{1 + y}_{1})$

$xy \cdot 1 + x'z \cdot 1$

$\boxed{xy + x'z}$

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$yz \cdot 1 = yz$

$yz(x + x')$

$$\underbrace{(x+y)(x'+z)(y+z)}_{\text{Ex 1}} = (x+y)(x'+z)$$

$$x.y + x'.z + y.z$$

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$$xy + x'z + yz = xy + x'z$$

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

Example 2.2 MM 5ed

- Find the complement of functions $F_1 = (x'yz' + x'y'z)$, $F_2 = x(y'z' + yz)$

$$F_1' = (x'yz' + x'y'z)'$$

$$= (x'yz')' \cdot (x'y'z)'$$

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