10.26

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$a = x \cdot x + y$

$a = x \cdot x + 1 \cdot y$ $\quad$ ($1 \cdot y = y$ property).

$a = x \cdot x + (x + x) y$ $\quad$ ($x + x = x$)

$a = x \cdot x + (x + x) y$

$a = x \cdot x (1 + y)$ $\quad$ factor out $x \cdot x$

$a = x (1)$ $\quad$ (null)

$a = x$

10.3b-

Concensus Theorm

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

$a' = x\cdot y + x'\cdot z + y\cdot z = x\cdot y + x'\cdot z$ dual

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

$a' = (x\cdot y) + (x'\cdot z) + (1\cdot y\cdot z)$ identity

$a' = (x\cdot y) + (x'\cdot z) + (x+x')\cdot y\cdot z$ Complementary $(x+x')=1$

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

$a' = (x\cdot y)(1+z) + (x'\cdot z)(1+y)$ factor

$a' = (x\cdot y)(1) + (x'\cdot z)(1)$ null

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

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

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

10.3b-

Concensus Theorm

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

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$a' = (x\cdot y)(1) + (x'\cdot z)(1)$ null

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

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

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

10.4. Prove DeMorgans law by giving dual proof in text.

$(a+b)' = a' \cdot b'$

$a = (a \cdot b) + (a' + b')$

$a' = (a \cdot b)(a' + b') = 0$ dual

$= a(a' + b') + b(a' + b')$ distributive.

$= aa' + ab' + ba' + bb'$ distributive.

$= (a + a')(a + b') + (b + b')(a + b)$ since $aa' = 0$ and $bb' = 0$

$b' + b = 1$

$= (1)(a' + b') + (1)(a' + b)$ distributive.

$= a + a' + b' + b = 0$ Equals zero.

10.6 b

$y = x \cdot y + x' \cdot y$

$= y(x + x')$ factor out y.

$= y(1)$ $x + x' = 1$

$= y$

10.7b

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

$$\begin{aligned} xy &= (xyy + xyx') && \text{Factor } xy \text{ through equation.} \\ &= xy + xx'y && \text{Rearrange} \\ &= xy + (0)y && xx' = 0 \\ &= xy + 0 && 0 \cdot y = 0 \\ &= xy \end{aligned}$$