

* Important theorem in factoring and multiplying out:

$$\underbrace{(X+Y)}_{\text{}} \underbrace{(X'+Z)}_{\text{}} = XZ + X'Y$$

* Another use for the theorem above:

$$AB + A'C = (A+C)(A'+B)$$

* Also works for two terms:

$$\begin{aligned} & (Q + AB')(C'D + Q') \\ &= (Q + AB')(Q' + C'D) \\ &= QC'D + Q'AB' \end{aligned}$$

* Important theorems to watch out for:

$$X \oplus Y \longrightarrow X'Y + XY'$$

$$X \equiv Y \longrightarrow XY + X'Y'$$

* In order to simplify an expression which contains AND and OR as well as Exclusive OR and equivalence, it is usually desirable to eliminate \oplus and \equiv operators

$$F = (A'B \equiv C) + (B \oplus AC')$$

$$F = B'AC' + B(A'+C) + ABC + A$$

$$+ (A+B')C' + A'BC$$

$$F = B(A'+C+A'C) + C'(B'A + A\cancel{B}B')$$

$$F = B(A'+C) + C'(A+B')$$

* Important:

$$(XY' + X'Y')' = XY + X'Y'$$