

Name: _____

Digital Logic

Kat's Cat Checker

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Kat needs a cat

“Any cat, as long as it's black!

“Or, a female cat, neutered, either white or orange, or a male cat, neutered, any color but white.”

What are the variables? (Remember, 1/0, true/false only)

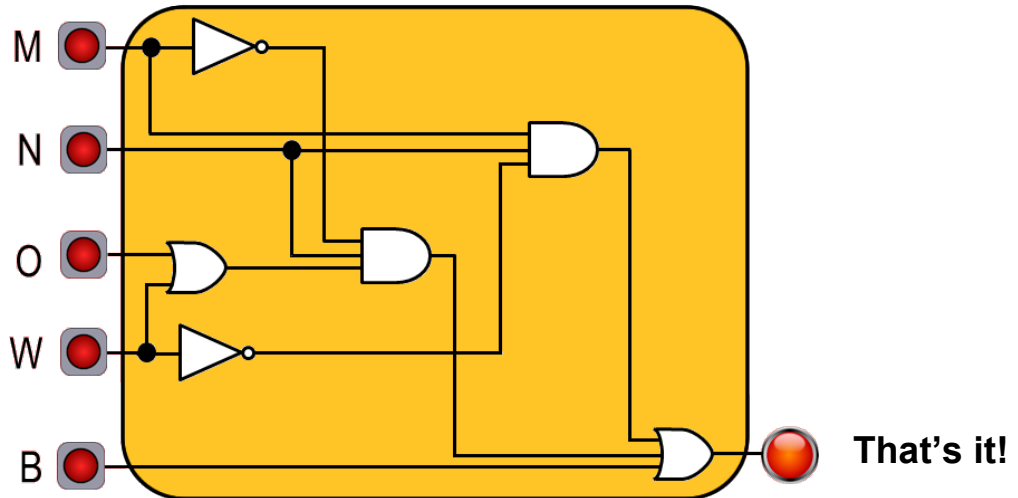
One of the choices: $\bar{M} \bullet N \bullet (W+O)$

Write the whole expression for Kat's ideal cat:

Some laws of Boolean algebra

Name	AND Form	OR Form
Identity law	$1 \bullet A = A$	$0 + A = A$
Null law	$0 \bullet A = 0$	$1 + A = 1$
Idempotent law	$A \bullet A = A$	$A + A = A$
Inverse law	$A \bullet \bar{A} = 0$	$A + \bar{A} = 1$
Commutative law	$A \bullet B = B \bullet A$	$A + B = B + A$
Associative law	$(A \bullet B) \bullet C = A \bullet (B \bullet C)$	$(A + B) + C = A + (B + C)$
Distributive law	$A + B \bullet C = (A + B) \bullet (A + C)$	$A \bullet (B + C) = A \bullet B + A \bullet C$
Absorption law	$A \bullet (A + B) = A$	$A + A \bullet B = A$
De Morgan's law	$\overline{A \bullet B} = \bar{A} + \bar{B}$	$\overline{A + B} = \bar{A} \bullet \bar{B}$

Build Kat's Cat Checker in Digital Works



Exercise: The Mystery of the Logician's Lunch

A logician goes into a restaurant and says, "I want a hamburger or a hotdog and French fries."
Assume AND takes precedence over OR; the English "or" is exclusive, XOR
Write the Boolean expression:

Which of the following possibilities will satisfy the logician's request?

- | | |
|---------------------------------|------------------------------|
| a. just a hamburger | e. a hotdog and French fries |
| b. just a hotdog | f. a hotdog and a hamburger |
| c. just French fries | g. all three |
| d. a hamburger and French fries | h. nothing. |

What if OR took precedence over AND? (That's why parentheses are important!)



College of Computing and Software Engineering

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