Additional Review Problems

1. Use a Truth Table to show $\overline{\textbf{A XOR B}}$ is equivalent to **A EQV B**

2. Use a Truth Table to show $\overline{\textbf{A EQV B}}$ is equivalent to ($\overline{\textbf{A}}$ **AND B**) **OR** (**A AND** $\overline{\textbf{B}}$)

3. Sketch a simplified logic circuit using only NAND gates that implement the OR function.
Hint: Consider De Morgan's Law.

4. Select the statements that are universally true for the stated conditions.

		For All A	Only if A is True	Only if A is False	Never
4a	$A + A = 1$				
4b	$A \bullet A = 0$				
4c	$A + 0 = 0$				
4d	$A + 1 = A$				
4e	$A + (A \bullet B) = A$				
4f	$A \bullet (A + B) = A$				
4g	$A \bullet (A + \overline{A}) = A$				
4h	$A \bullet (A + \overline{A}) = 0$				
4i	$A \bullet (A + \overline{A}) = 1$				
4j	$\overline{A} + (A \bullet A) = 0$				
4k	$A + \overline{A} = 0$				
4l	$A \bullet \overline{A} = 0$				
4m	$A + \overline{A} = 1$				
4n	$A + \overline{A} = A$				
4o	$A + \overline{A} = \overline{A}$				
4p	$A \bullet \overline{A} = A$				

Additional Review Problems - continued

5. Determine the value (True or False of the expression, given the values of P & Q.

	Expression	**P**	**Q**	**Answer**
5a	P AND Q	True	False	
5b	P AND $\overline{Q}$	True	False	
5c	$\overline{P}$ AND $\overline{Q}$	False	True	
5d	$\overline{P}$ AND Q	False	True	
5e	P AND Q	False	False	
5f	P AND $\overline{Q}$	True	True	
5g	$\overline{P}$ AND $\overline{Q}$	True	False	
5h	$\overline{P}$ OR Q	False	False	
5i	P OR Q	True	False	
5j	P OR $\overline{Q}$	True	False	
5k	$\overline{P}$ OR $\overline{Q}$	False	True	
5l	$\overline{P}$ OR Q	False	True	
5m	P OR Q	False	False	
5n	P OR $\overline{Q}$	True	True	
5o	$\overline{P}$ OR $\overline{Q}$	True	False	
5p	$\overline{P}$ OR Q	False	False	

Incubator of Possible Test Eight Bonus Questions

In class, we stated that ALL algebras exhibit the Distributive Property of Multiplication across Addition.
For example: X (Y + Z) = XY + XZ

It is trivial to show that the Distributive Property of Addition across Multiplication does NOT apply to the integers. That is to say, in general: $X + (Y\ Z) \neq (X + Y)\ (X + Z)$
Let X = 2, Y = 3, Z = 4;
$2 + (3 \times 4) \neq (2 + 3) \times (2 + 4)$
$2 + 7 \neq (5) \times (6)$
$9 \neq 30$

But what about Boolean Algebra?

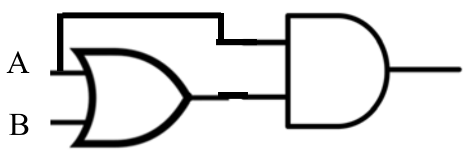
Use Truth Tables to prove the Distributive Property of AND across OR
A ● (B + C) = (A ● B) + (A ● C)

Use Truth Tables to determine whether or not the Distributive Property of OR across AND applies to Boolean Algebra. That is to ask, does

$A + (B \bullet C) \overset{?}{=} (A + B) \bullet (A + C)$ for all A, B, C.

Does the diagram below resemble any of the Boolean Algebra Properties that we discussed in class?

If not, use a Truth Table to reveal a simplified equivalent circuit.



Similarly, what about this circuit?