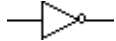








Logic Functions & Gates																																																																																																																																																																																																																															
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Function	$Y = \bar{A}$	$Y = A \times B$	$Y = A + B$	$Y = \overline{A \times B}$	$Y = \overline{A + B}$	$Y = A \oplus B$ $Y = \bar{A}B + A\bar{B}$	$Y = \overline{A \oplus B}$ $Y = \bar{A}B + A\bar{B}$																																																																																																																																																																																																																								
2-Input Truth Table Showing Enable & Inhibit	<table border="1" data-bbox="226 467 321 557"> <tr><td>A</td><td>Y</td></tr> <tr><td>0</td><td>1</td></tr> <tr><td>1</td><td>0</td></tr> </table>	A	Y	0	1	1	0	<table border="1" data-bbox="363 443 583 573"> <tr><td>A</td><td>B</td><td>Y</td><td>E/I</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>(Y=0)</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>Inhibit</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>(Y=B)</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>Enable</td></tr> </table>	A	B	Y	E/I	0	0	0	(Y=0)	0	1	0	Inhibit	1	0	0	(Y=B)	1	1	1	Enable	<table border="1" data-bbox="615 443 835 573"> <tr><td>A</td><td>B</td><td>Y</td><td>E/I</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>(Y=B)</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>Enable</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>(Y=1)</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>Inhibit</td></tr> </table>	A	B	Y	E/I	0	0	0	(Y=B)	0	1	1	Enable	1	0	1	(Y=1)	1	1	1	Inhibit	<table border="1" data-bbox="867 427 1087 589"> <tr><td>A</td><td>B</td><td>Y</td><td>E/I</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>(Y=1)</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>Inhibit</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>(Y=<math>\bar{B}</math>)</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>Enable</td></tr> </table>	A	B	Y	E/I	0	0	1	(Y=1)	0	1	1	Inhibit	1	0	1	(Y= $\bar{B}$ )	1	1	0	Enable	<table border="1" data-bbox="1119 427 1339 589"> <tr><td>A</td><td>B</td><td>Y</td><td>E/I</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>(Y=<math>\bar{B}</math>)</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>Enable</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>(Y=0)</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>Inhibit</td></tr> </table>	A	B	Y	E/I	0	0	1	(Y= $\bar{B}$ )	0	1	0	Enable	1	0	0	(Y=0)	1	1	0	Inhibit	<table border="1" data-bbox="1413 435 1633 581"> <tr><td>A</td><td>B</td><td>Y</td><td>E/I</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>(Y=B)</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>Enable</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>(Y=<math>\bar{B}</math>)</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>Enable</td></tr> </table>	A	B	Y	E/I	0	0	0	(Y=B)	0	1	1	Enable	1	0	1	(Y= $\bar{B}$ )	1	1	0	Enable	<table border="1" data-bbox="1749 435 1969 581"> <tr><td>A</td><td>B</td><td>Y</td><td>E/I</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>(Y=<math>\bar{B}</math>)</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>Enable</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>(Y=B)</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>Enable</td></tr> </table>	A	B	Y	E/I	0	0	1	(Y= $\bar{B}$ )	0	1	0	Enable	1	0	0	(Y=B)	1	1	1	Enable																																																																																										
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3-Input Truth Table	Note: A $\circ$ on the inputs or outputs represents active LOW	<table border="1" data-bbox="384 695 562 922"> <tr><td>A</td><td>B</td><td>C</td><td>Y</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td></tr> </table>	A	B	C	Y	0	0	0	0	0	0	1	0	0	1	0	0	0	1	1	0	1	0	0	0	1	0	1	0	1	1	0	0	1	1	1	1	<table border="1" data-bbox="636 695 814 922"> <tr><td>A</td><td>B</td><td>C</td><td>Y</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td></tr> </table>	A	B	C	Y	0	0	0	0	0	0	1	1	0	1	0	1	0	1	1	1	1	0	0	1	1	0	1	1	1	1	0	1	1	1	1	1	<table border="1" data-bbox="888 695 1066 922"> <tr><td>A</td><td>B</td><td>C</td><td>Y</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>0</td></tr> </table>	A	B	C	Y	0	0	0	1	0	0	1	1	0	1	0	1	0	1	1	1	1	0	0	1	1	0	1	1	1	1	0	1	1	1	1	0	<table border="1" data-bbox="1140 695 1318 922"> <tr><td>A</td><td>B</td><td>C</td><td>Y</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>0</td></tr> </table>	A	B	C	Y	0	0	0	1	0	0	1	0	0	1	0	0	0	1	1	0	1	0	0	0	1	0	1	0	1	1	0	0	1	1	1	0	<table border="1" data-bbox="1434 695 1612 922"> <tr><td>A</td><td>B</td><td>C</td><td>Y</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>1</td></tr> </table>	A	B	C	Y	0	0	0	0	0	0	1	1	0	1	0	1	0	1	1	0	1	0	0	1	1	0	1	0	1	1	0	0	1	1	1	1	<table border="1" data-bbox="1770 695 1948 922"> <tr><td>A</td><td>B</td><td>C</td><td>Y</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>1</td></tr> <tr><td>0</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>1</td><td>0</td><td>1</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>1</td><td>1</td><td>1</td><td>0</td></tr> </table>	A	B	C	Y	0	0	0	1	0	0	1	0	0	1	0	0	0	1	1	1	1	0	0	0	1	0	1	1	1	1	0	1	1	1	1	0
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Theorems of Boolean Algebra				
Commutative	Double Inversion	AND	OR	XOR
$x + y = y + x$	$\overline{\overline{x}} = x$	$x \times 0 = 0$	$x + 0 = x$	$x \oplus 0 = x$
$x \times y = y \times x$	DeMorgan	$x \times 1 = x$	$x + 1 = 1$	$x \oplus 1 = \bar{x}$
Associative	$\overline{\overline{xy}} = \overline{\bar{x} + \bar{y}}$	$x \times x = x$	$x + x = x$	$x \oplus x = 0$
$x + (y + z) = (x + y) + z$	$\overline{\overline{x + y}} = \overline{\bar{x}\bar{y}}$	$x \times \bar{x} = 0$	$x + \bar{x} = 1$	$x \oplus \bar{x} = 1$
$x(yz) = (xy)z$	Other Multivariable			
Distributive	$x + xy = x$			
$x(y + z) = xy + xz$	$(x + y)(x + z) = x + yz$			
$(x + y)(w + z) = xw + xz + yw + yz$	$x + \overline{xy} = x + y$			

Karnaugh Map (K-Map)											
Two Variable			Three Variable			Four Variable					
A \ B		$\bar{B}$	B	C / CD		$\bar{C}$	C	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
		0	1			0	1	00	01	11	10
$\bar{A}$	0			$\bar{A}\bar{B}$	00						
$\bar{A}$	1			$\bar{A}B$	01						
				AB	11						
				$A\bar{B}$	10						