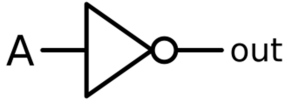
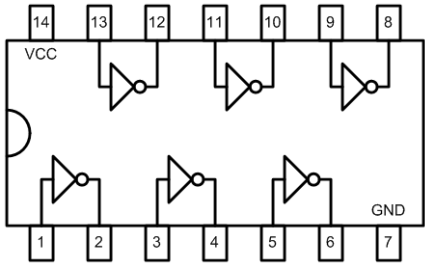
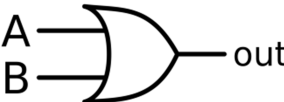
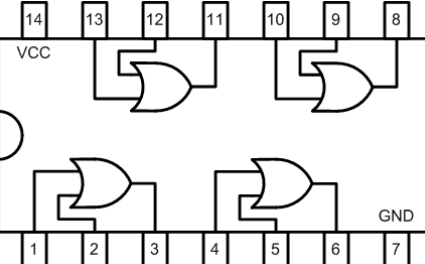
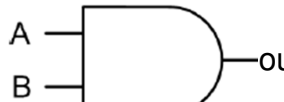
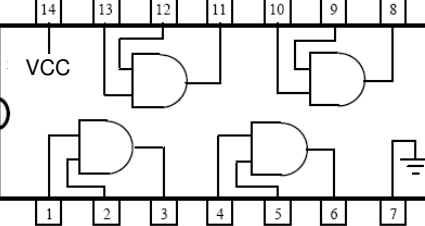
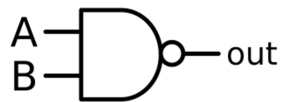
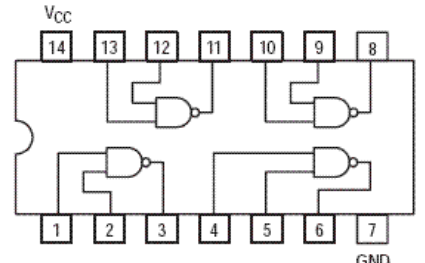
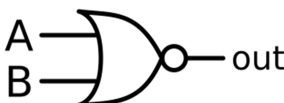
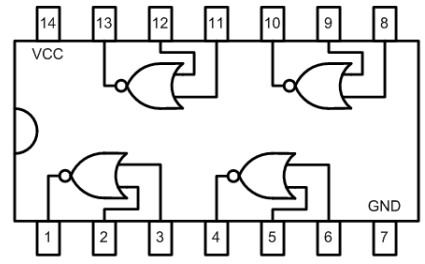

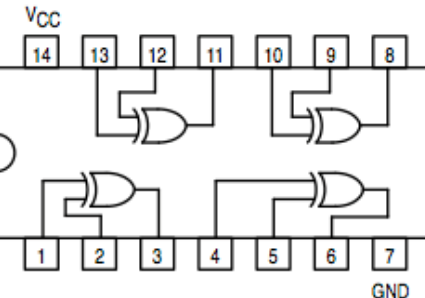
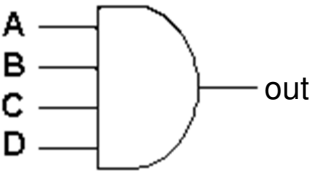
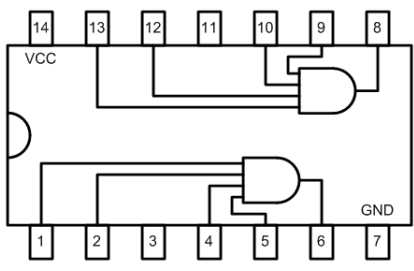
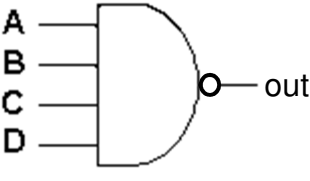
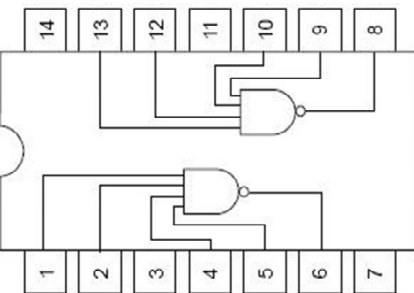
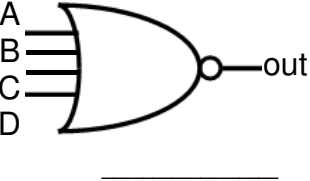
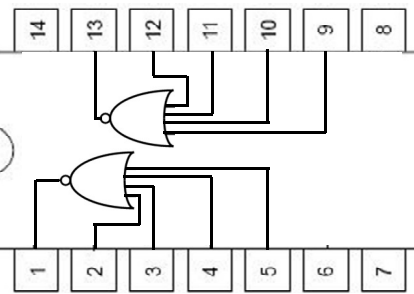
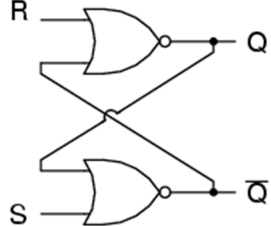
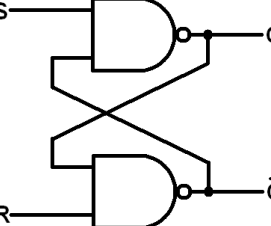


Quick Guide on Basic Logic Gates

Gate	Symbol	Truth table	IC															
NOT Gate (74HC04)	 <p style="text-align: center;">$out = \bar{A}$</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> </tr> </tbody> </table>	A	Out	0	1	1	0										
A	Out																	
0	1																	
1	0																	
OR gate (74HC32)	 <p style="text-align: center;">$out = A + B$</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>B</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table>	A	B	Out	0	0	0	0	1	1	1	0	1	1	1	1	
A	B	Out																
0	0	0																
0	1	1																
1	0	1																
1	1	1																
AND gate (74HC08)	 <p style="text-align: center;">$out = A \cdot B$</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>B</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table>	A	B	Out	0	0	0	0	1	0	1	0	0	1	1	1	
A	B	Out																
0	0	0																
0	1	0																
1	0	0																
1	1	1																
NAND gate (74AC00)	 <p style="text-align: center;">$out = \overline{A \cdot B}$</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>B</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table>	A	B	Out	0	0	1	0	1	1	1	0	1	1	1	0	
A	B	Out																
0	0	1																
0	1	1																
1	0	1																
1	1	0																
NOR gate (74HC02)	 <p style="text-align: center;">$out = \overline{A + B}$</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>B</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table>	A	B	Out	0	0	1	0	1	0	1	0	0	1	1	0	
A	B	Out																
0	0	1																
0	1	0																
1	0	0																
1	1	0																
XOR gate (74HC86)	 <p style="text-align: center;">$out = A \oplus B$</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>B</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table>	A	B	Out	0	0	0	0	1	1	1	0	1	1	1	0	
A	B	Out																
0	0	0																
0	1	1																
1	0	1																
1	1	0																

Gate	Symbol	Truth table	IC																				
AND gate (7421)	 <p>out = $A \cdot B \cdot C \cdot D$</p>	<table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> <tr> <td colspan="4">Any other combination of A, B, C, D</td> <td>0</td> </tr> </tbody> </table>	A	B	C	D	Out	0	0	0	0	0	1	1	1	1	1	Any other combination of A, B, C, D				0	
A	B	C	D	Out																			
0	0	0	0	0																			
1	1	1	1	1																			
Any other combination of A, B, C, D				0																			
NAND gate (74HC20)	 <p>out = $\overline{A \cdot B \cdot C \cdot D}$</p>	<table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>0</td> </tr> <tr> <td colspan="4">Any other combination of A, B, C, D</td> <td>1</td> </tr> </tbody> </table>	A	B	C	D	Out	0	0	0	0	1	1	1	1	1	0	Any other combination of A, B, C, D				1	
A	B	C	D	Out																			
0	0	0	0	1																			
1	1	1	1	0																			
Any other combination of A, B, C, D				1																			
NOR gate (74HC4002)	 <p>out = $\overline{A + B + C + D}$</p>	<table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>0</td> </tr> <tr> <td colspan="4">Any other combination of A, B, C, D</td> <td>0</td> </tr> </tbody> </table>	A	B	C	D	Out	0	0	0	0	1	1	1	1	1	0	Any other combination of A, B, C, D				0	
A	B	C	D	Out																			
0	0	0	0	1																			
1	1	1	1	0																			
Any other combination of A, B, C, D				0																			

Latch	Symbol	Truth table																														
NOR Latch		<table border="1"> <thead> <tr> <th>S</th> <th>R</th> <th>Q</th> <th>\bar{Q}</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>Latch</td> <td>Latch</td> </tr> <tr> <td>0</td> <td>1</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> </tbody> </table>	S	R	Q	\bar{Q}	0	0	Latch	Latch	0	1	0	1	1	0	1	0	1	1	0	0										
S	R	Q	\bar{Q}																													
0	0	Latch	Latch																													
0	1	0	1																													
1	0	1	0																													
1	1	0	0																													
NAND Latch		<table border="1"> <thead> <tr> <th>S</th> <th>R</th> <th>Q</th> <th>\bar{Q}</th> <th>Condition</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> <td>1</td> <td>0</td> <td></td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>0</td> <td>Set state</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td></td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>1</td> <td>Reset state</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>1</td> <td>Undefined</td> </tr> </tbody> </table>	S	R	Q	\bar{Q}	Condition	0	1	1	0		1	1	1	0	Set state	1	0	0	1		1	1	0	1	Reset state	0	0	1	1	Undefined
S	R	Q	\bar{Q}	Condition																												
0	1	1	0																													
1	1	1	0	Set state																												
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