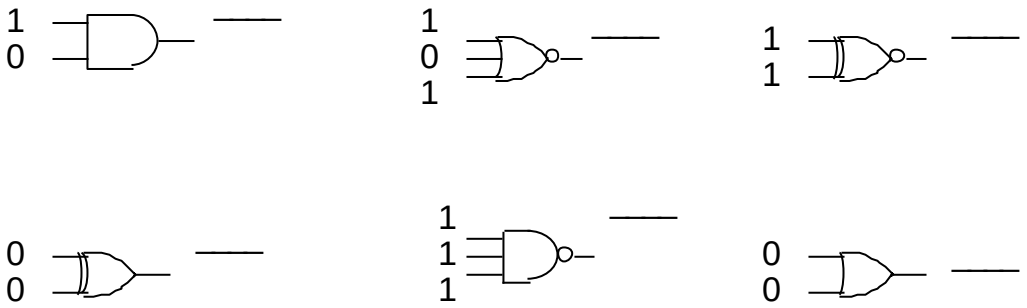
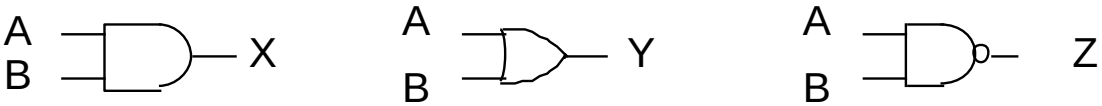
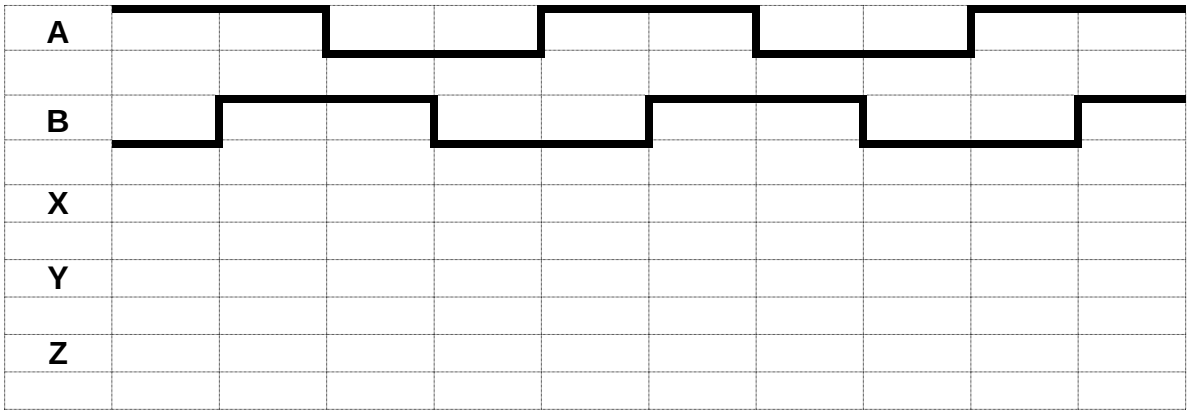
Predict the output of each gate:

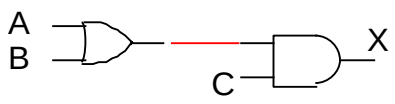


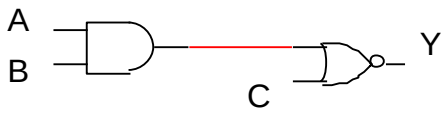
Draw the output waveform for each of the following gates:

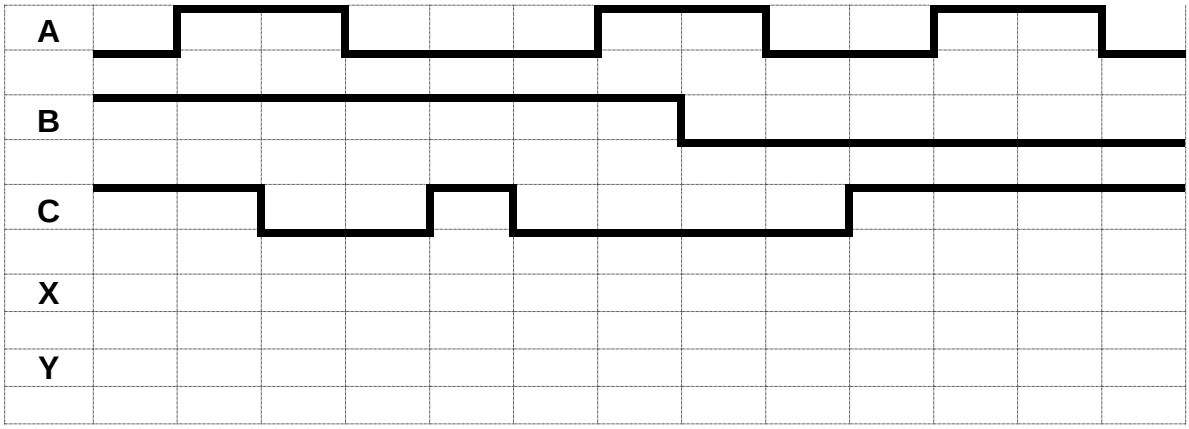




Draw the output for the following circuits:







Convert the following Binary numbers to decimal:

1011001_2 = _____$_{10}$ **1101111_2 = _____$_{10}$**

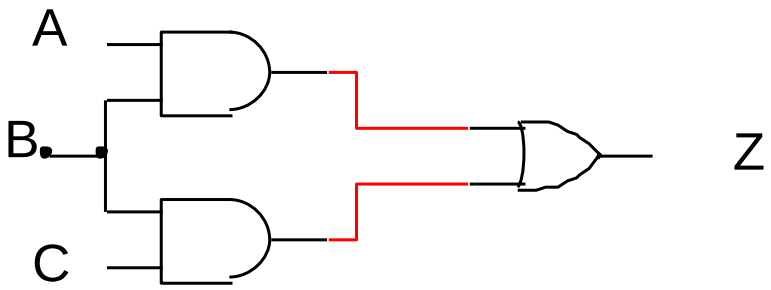
Convert the following decimal numbers to BCD:

729_{10} = _____BCD **47_{10} = _____BCD**

Convert the following Binary numbers to Hexadecimal:

$1110\ 1111_2$ = _____$_{16}$ **$1001\ 1010_2$ = _____$_2$**

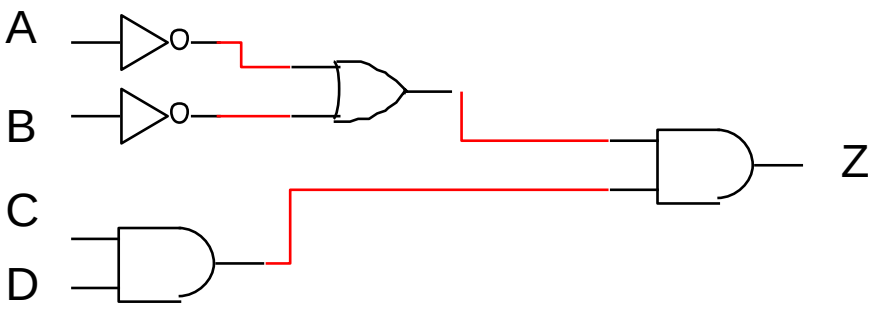
Write the Boolean equation and develop the truth table for the following:
(DO NOT SIMPLIFY!)



Boolean Equation: _____

A	B	C						
0	0	0						
0	0	1						
0	1	0						
0	1	1						
1	0	0						
1	0	1						
1	1	0						
1	1	1						

Write the Boolean equation and develop the truth table for the following:
(DO NOT SIMPLIFY!)



Boolean Equation: _____

A	B	C	D							
0	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	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							

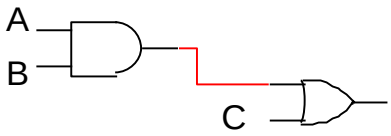
Draw the circuit for the following Boolean equations

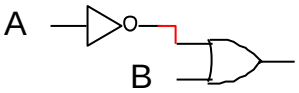
$A + \overline{BC}$

$\overline{AB + CD}$

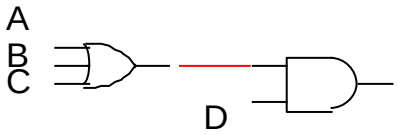
$\overline{A}B + C(\overline{C + D})(B + C)$

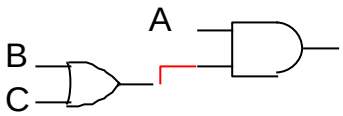
Re-draw the following circuits using only NAND Gates (bubble push):



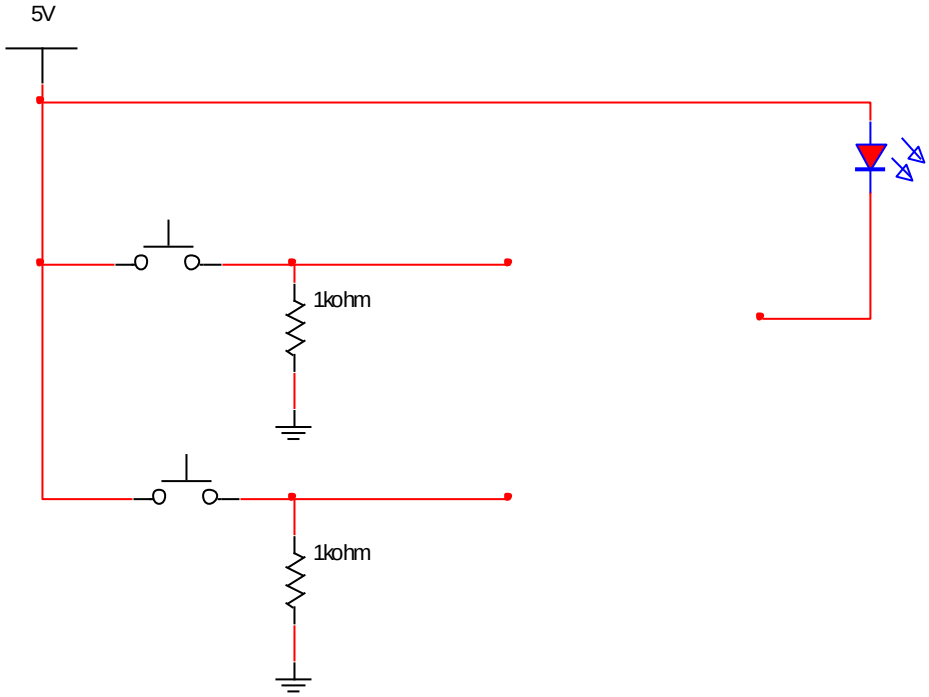


Re-draw the following circuits using only NOR Gates (bubble push):

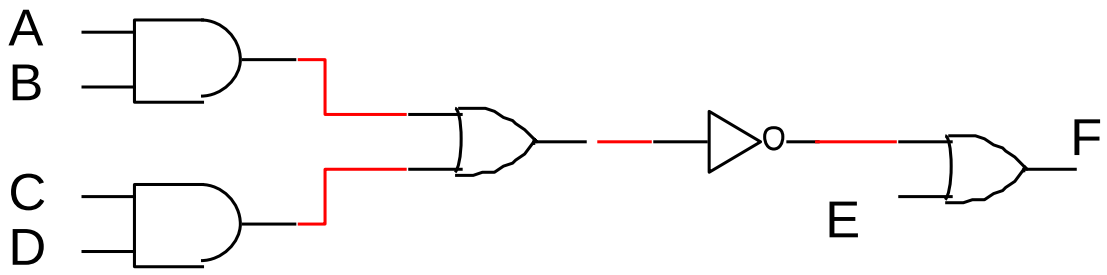




Insert a single gate (1 one) to turn <u>on</u> the LED <u>ONLY if ONE</u> switch is closed. If both switches are closed or open the LED stays OFF.



Use this circuit for the following questions



Write the Boolean equation: _____

(Circle the correct answer)

If A = 1 B = 0 C = 0 D = 0 and E = 0 then the output F is

HIGH LOW UNDETERMINED

If A = 0 D = 0 and E = 0 then the output is

HIGH LOW UNDETERMINED

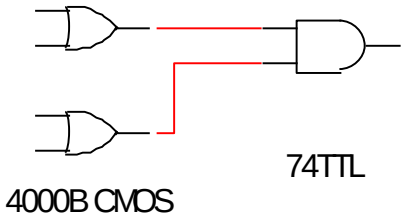
If A = 1 C = 1 and E = 1 then the output is

HIGH LOW UNDETERMINED

Use the table on page 347 to complete the following

Parameter	74LSTTL	4000B CMOS
V_{IH}		
V_{IL}		
V_{OH}		
V_{OL}		
I_{IH}		
I_{IL}		
I_{OH}		
I_{OL}		

Based on the information in the table above, will the circuit operate when connected as shown? Why or why not?



What is the fan-out of the 4000B CMOS chip?

What is the fan-out of the 74LSTTL chip?

What is the noise margin for the 4000B CMOS chip?

What is the noise margin for the 74LSTTL chip?