ME218a Final Exam

Due by 4:30pm on 12/11/97

Name:_____

I Certify that I have taken this examination is compliance with the Stanford University Honor Code.

_____
Signature

This is the Cover Sheet for your Solution !

#1_____
#2_____
#3_____
#4_____
#5_____
#6_____
#7_____
#8_____
#9_____
#10_____
Total_____

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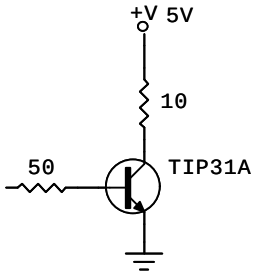
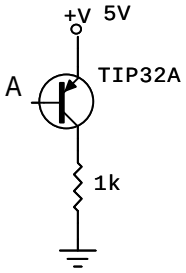
Problem 1 (10pts)



You encounter an output circuit like the one shown above.

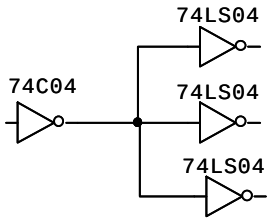
a) What measurement(s) of the nodes shown would you make to determine whether or not the transistor is in saturation ?
b) If you could only make a single measurement, what would it be and what value (or range) would you expect if the transistor was in saturation ?

Problem 2 (10pts)



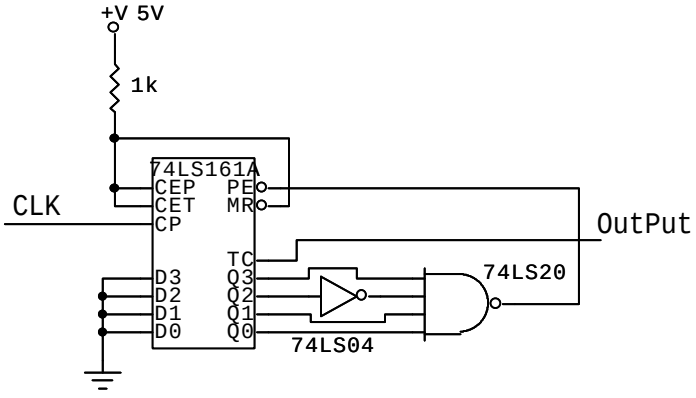
a) What voltage is necessary at point A to force the TIP32 into saturation ?
b) What current (direction and magnitude) must be sourced/sunk at point A to force the TIP32 into saturation ?

Problem 3 (5pts)



Can you explain to your lab-bench partner why their circuit (above) is not working ? Be very specific about the details, quoting specifiations.

Problem 4 (10pts)

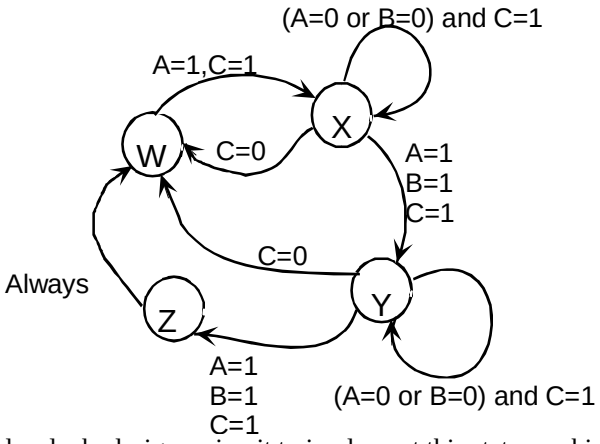


What is the maximum clock frequency, without exceeding specifications, for this circuit ?

Problem 5 (5pts)

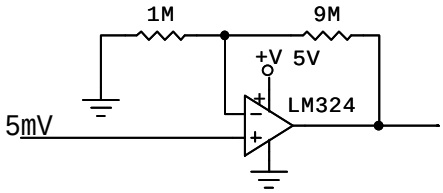
Describe the output signal from the circuit in problem 4.

Problem 6 (15pts)



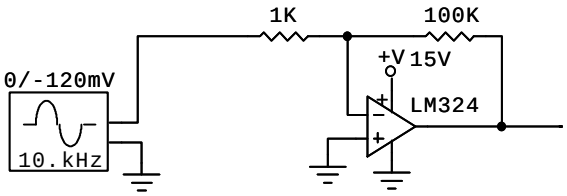
Given the 3 logic inputs, A,B,C and a clock, design a circuit to implement this state machine. Minimize the logic required.

Problem 7 (10pts)



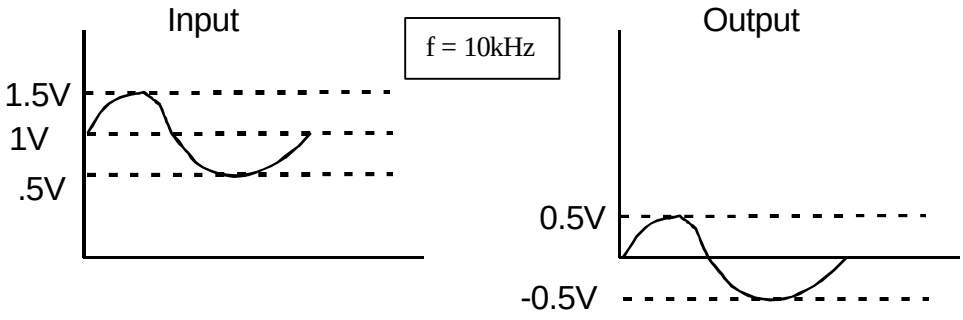
What voltage would you expect at the output of the LM324 ?

Problem 8 (10pts)



Describe the output amplitude of the LM324 in this circuit.

Problem 9 (10pts)



Show 2 different circuit designs (including component values) that would transform the input signal into the output signal with no more than 1% error in amplitude. Phase is unimportant, and you may ignore component tolerances.

Problem 10 (15pts)

Design a circuit that will light an LED (V_f = 1.5V @ 2mA) when an input voltage is greater than 2V or less than 1V.