ME218a Final Exam
Due by 4:30pm on 12/11/97

Name:______________________________

I Certify that I have taken this examination in 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_______
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 specifications.

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 ($V_t = 1.5V @ 2mA$) when an input voltage is greater than 2V or less than 1V.