CpE213 – TEST I

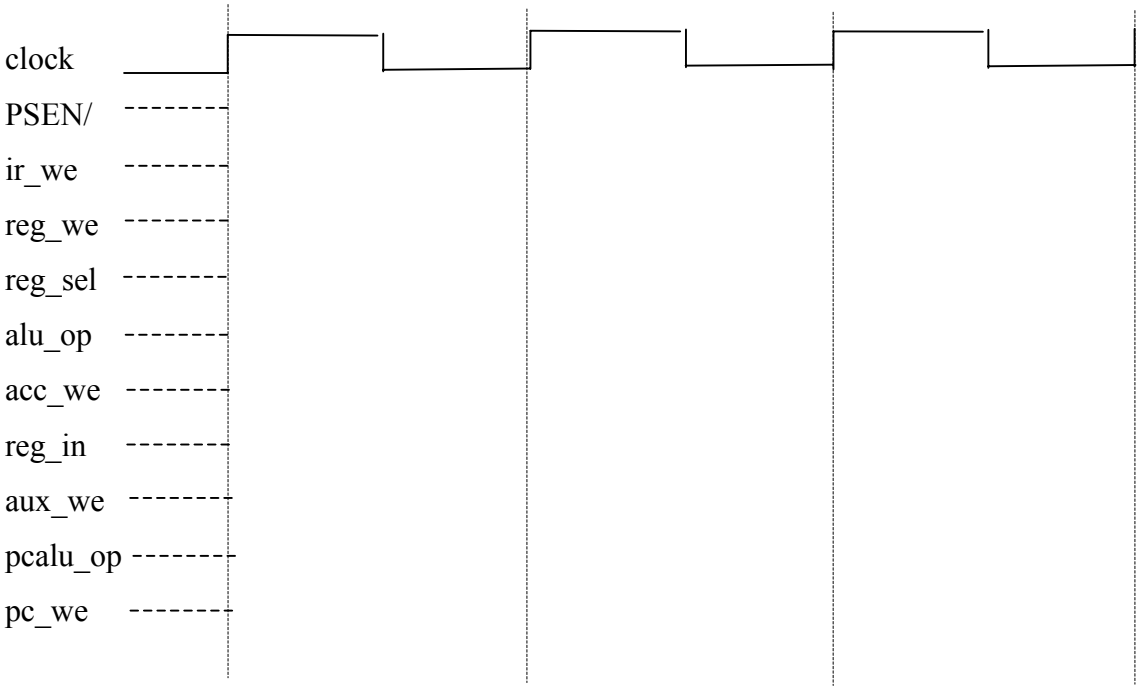
Name_____

Show all your work in the space provided. Answers with a simple "yes", "no", or a single number are typically incomplete and will not be given full credit. Answers in non-reduced form, like (a+sqrt(b))/c, are fine where appropriate. Good English on essay/short answer questions is required. ON MULTIPLE CHOICE QUESTIONS, IF YOU'RE NOT SURE DON'T GUESS – you will get points off for wrong answers. If you know part of an answer, write what you know for partial credit.

1. (15 Points) Assume the WIMP51 is performing the instruction "MOV A, R3". Show the contents of each register at the **end** of each clock cycle. Assume the Fetch cycle begins with clock cycle 1 and that the instruction ends with clock 3.

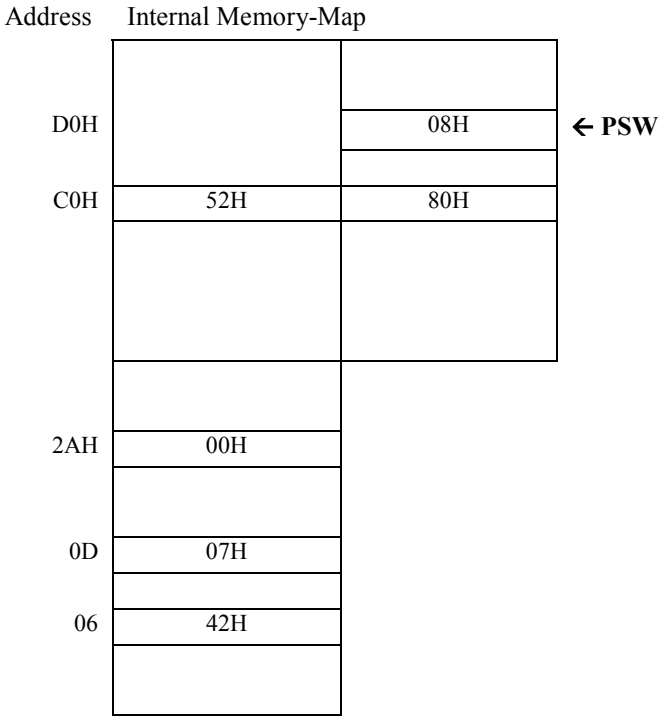
Register	Clock 0	Clock 1	Clock 2	Clock 3
IR	42			
ACC	2A			
AUX	00			
PC	F0			
R3	07			

2. (20 Points) Draw the timing diagram for the following control signals when the WIMP51 is executing the instruction "ADDC A,#42H". If you don't think a control signal is doing anything important, indicate so with a "don't care" (a dotted line down the middle). Give "command" values for pcalu_up and alu_op rather than numeric values (e.g. give value as "pcalu_up=PC_INC" instead of "pcalu_up=42"). If you're not sure, make your best guess (but tell me it's a guess and why).



3. (15 Points) Why do we write a 1 to an 8051 port to use it as an input? Explain carefully. Assume I don't understand how an 8051 I/O port works – you'll be graded on how well I understand the need to write a 1 after reading your explanation.

4. (10 Points – 2 points each)



The map above shows the contents of at least part of the 8051's memory. What value is in the ACC after executing the following instructions:

a) MOV A, 2AH

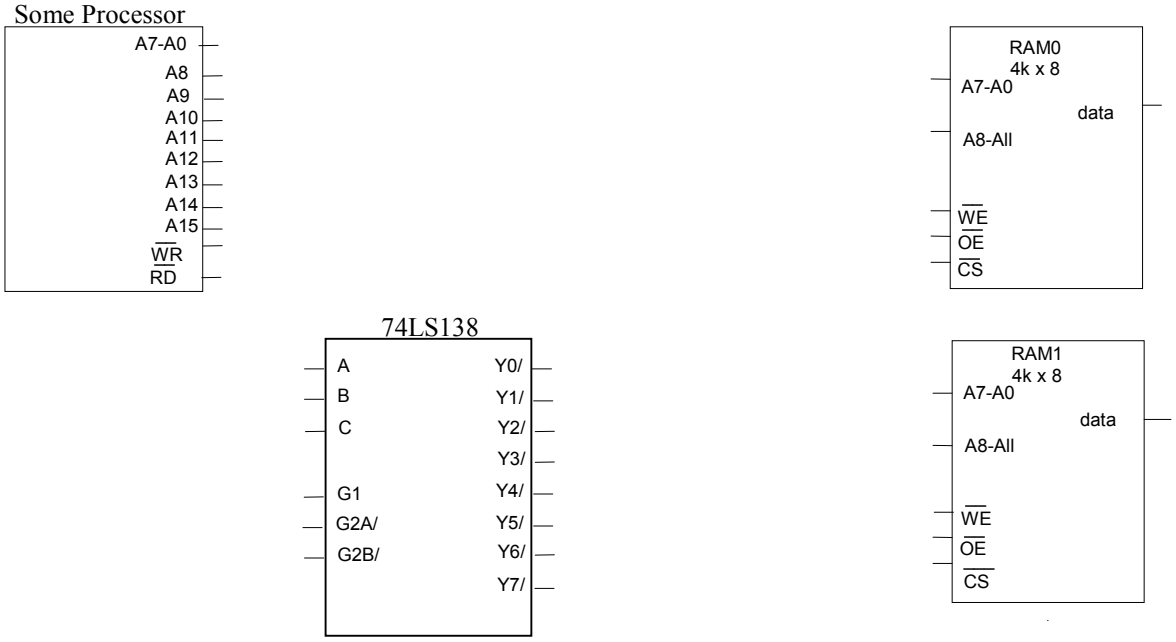
b) MOV R0,#2AH
MOV A, @R0

c) MOV A, C0H

d) MOV R1, #C0H
MOV A, @R1

e) MOV A, R6 (stop and think)

5. (20 Points) For the components in the following diagram, connect the address and control lines to a) Give RAM 0 an address space of 0000-7FFF and b) Give RAM1 an address space of E000-EFFF. Don't worry about hooking up the data lines for now. (address space refers to the addresses by which the processor can access only that chip. You can do one part of this problem without doing the other).



6. (20 Points) The following is a timing diagram for the 8051 microcontroller.
   a. (10 Points) Name what instruction(s) were fetched by the 8051 during this instruction sequence. If a dummy fetch occurred, mark it.
   b. (10 Points) If possible, give the value of some data in external <u>data</u> memory (give both the address and the value – I don't want a value in code memory).