Computing 101 Introduction to Computing
Summer 2001 - Homework Assignment #2

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This is a written homework assignment. Questions are taken from Schneider and Gersting. The assignment is due in the lab by the end of your lab session on August 2nd.

Note: The first 8 questions below are from sub-chapters 4.1 - 4.3. On quiz 1 you will be tested on the material from these chapters. Although the homework is not due until later, it would be an <u>excellent idea</u> to work on these questions before the quiz!

Chapter 4 (exercises on pages 166 - 167):

Question	Description	Marks

1.	Exercise #1 a, c
	with the following modifications:
	    a. 103
	    c. F1F
		2

2.	Exercise #3 c, d	2
3.	If a computer uses 10 bits to represent integer values, what is the largest unsigned value that can be represented?	1
4.	Exercise #5 c, d	2

5.	Exercise #7 a, b, c
	with the following modifications:
	    a. $+9.250$
	    b. -10.125
	    c. $-\dfrac{1}{32}$
		3

6.	Exercise #8 a, d	2
7.	How many binary digits would it take to represent the following phrase in ASCII code: The Truth Is Out There	1
8.	Exercise #11 b, d but modify the question to assume that $a = 1, b = 0$, and $c = 2$.	2
9.	Exercise #14 (show both the Boolean expression and the the circuit diagram).	4
10.	Exercise #17 (show both the Boolean expression and the the circuit diagram).	5
11.	How many selector lines would be needed on a 32-input multiplexor?	1

Chapter 5 (exercises on pages 228 - 229):

Question	Exercise	Marks

1.	Answer the following questions about the *memory subsystem*:
	   a. A memory unit (RAM) with 128MB of memory would contain
	      exactly how many memory cells?
	   b. What does the term *memory access time* stand for?
	   c. If a computer has a memory address register (MAR) that is 24
	      bits wide, what is the maximum memory size of the computer?
	   d. In the Von Neumann Architecture the other sub-systems access
	      data in memory via two special-purpose registers (MAR, MDR).
	      What is the purpose of each of these two registers?
		5

2.	Explain what use a read-only memory (ROM) could possibly serve in the design of a computer system. What type of information could be kept in a ROM, and how could that information originally get into the memory?	3

3.	Exercise #12 a, b
	with the following modifications:
	   • the rotation speed is 7200 rev/min,
	   • there are 120 sectors per track,
	   • there is no fixed startup time,
	   • the read/write head moves on average 50 tracks.
		5

4.	Exercise #13	2
5.	What is the purpose of the registers located in the ALU?	1

6.	Answer the following questions about the *control unit*:
	   a. Briefly describe the purpose of the instruction register (IR)?
	   b. Briefly describe what happens during the store phase of an instruction execution?
	   c. Briefly describe the actions the control unit carries out in the
	      execute phase, during the execution of the *JUMP X* instruction.
		3

Total 44 marks.