Homework 7
Computer Pieces-Parts

**Due Date:** Tuesday 28, 2012.

There is a possible 32 points for this homework.

A word to the wise: For any of the following problems if you elect not to show your work it will be impossible to award any partial credit for an incorrect answer.

**Problem 1.** (5 pts.) Draw a circuit using the “sum-of-products” algorithm whose output matches the following truth table:

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**Problem 2.** (5 pts. Odd-parity circuit) Design an odd-parity circuit. This is a circuit that has three inputs and one output. The circuit outputs a 1 if and only if an even number (0 or 2) of inputs are a 1. Otherwise, the circuit outputs a 0. Thus the sum of the number of 1 bits in the input and output is always an odd number. Provide a truth table in addition to your circuit.

**Problem 3.** (6 pts.) Consider the following hard drive characteristics:

- Rotation speed: 7200 rotations per minute (rpm)
- Seek time (a.k.a. Arm movement time): 8 ms
- Numbers of tracks per surface: 255
- Number of sectors per track: 63
- Number of surfaces: 2
- Number of characters/bytes per sector: 512
1. What is the capacity of this device? Express your answer in millions of bytes (i.e. megabytes).

2. What is the maximum number of files this device can store?

3. Assuming it takes 0 ms to actual transfer the data, how long -in milliseconds- does it take to find (and transfer) the data on a given location: surface no., track no., and sector no?

Problem 4. (10 pts.) Go online (e.g. Newegg.com) and find the replacement cost of the following components in your personal computer/laptop.
1. Your CPU.
2. Replacement memory for your machine - 2GB memory chip/stick.
3. Replacement hard-drive for your machine. Note: desktops use 3.5” drives, while laptops use 2.5” drives - 1TB drive.
4. An external optical drive.
5. A power supply for your machine.

In each case, provide the price and a short (1-2 line) description of the item.

Problem 5. (8 pts.) Using online resources, answer the following questions:
1. Capacity, in megabytes, of a CD.
2. Capacity, in megabytes, of a single-sided DVD.
3. Cost and capacity of the largest USB key/flash drive.
4. Cost of the cheapest 1 TB (terabyte) external hard drive.

Problem 6. (8 pts.) Using the above capacity data, answer the following questions:
1. Assuming a blank CD costs 5 cents, the cost/MB for CDs.
2. Assuming a blank DVD costs $1.00, the cost/MB for a DVD.
3. Cost/MB for the USB key/flash drive you found in the above problem.
4. Cost/MB of the 1 TB hard drive you found in the above problem.

Problem 7. (Extra Credit 5 pts.) In problem 1, you calculated the time it takes to locate and transfer a block of data to/from a hard drive. Look up and provide the same values for CD’s, DVD’s and USB key/flash drives.