

Name: _____

ID: _____

ECS 15: Introduction to Computers
Midterm
November 2nd, 2011

Notes:

- 1) The midterm is open book, open notes.
- 2) You have 50 minutes, no more: I will strictly enforce this.
- 3) The midterm is divided into 2 parts, and graded over 120 points
- 4) You can answer directly on these sheets (preferred), or on loose paper.
- 5) Please write your name at the top right of each page you turn in!
- 6) Please, check your work! If possible, show your work when multiple steps are involved.

Part I (15 questions, each 4 points; total 60 points)

(These questions are multiple choices; in each case, find the most **plausible** answer)

- 1) *When your computer slows down significantly, it is likely that you may be ...*
 - a. Running out of ROM,
 - b. **Running out of RAM,**
 - c. Running out of disk space,
 - d. Have too much ROM.

- 2) *How many bytes are there in one Megabyte (MB)?*
 - a. 1,000,000
 - b. 1,000,024
 - c. **1,048,576**
 - d. 1,024,000

- 3) *If an 8-bit integer has a maximum of 256 possible values, what is the highest possible value of a 16-bit integer?*
 - a. 512
 - b. 65536
 - c. **65535**
 - d. 32767

- 4) *How much space would you need to store a 10 min song that has been sampled at 44.1 KHz, with each data point stored on 16 bits, in stereo (assume no compression)?*
 - a. **About 100 MBytes**
 - b. About 100 Mbits
 - c. About 50 Mbytes
 - d. About 5 Mbytes

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- 5) *If your computer starts thrashing, it is likely that:*
- The CPU starts overheating,
 - The hard drive starts failing,
 - You have too many applications opened simultaneously,**
 - You have been disconnected from the Internet.
- 6) *Assuming that there are 600,000 characters in the UNICODE, what is the minimal number of bits needed to store a word of ten characters with this code?*
- 19
 - 20
 - 200**
 - 10
- 7) *If a computer fails the POST, it is likely that:*
- The operating system has crashed,
 - One application is using more memory than it has asked for,
 - The Master Boot Record is empty,
 - One piece of hardware attached to the computer has failed.**
- 8) *Which of the following retains its information when the computer is turned off?*
- ROM**
 - CPU
 - RAM
 - GPU
- 9) *The binary representation of the hexadecimal 7F is*
- 01111110
 - 10111111
 - 01111111**
 - 11111111
- 10) *On a 16 bit color display, each pixel can be represented with how many different colors?*
- 16
 - 256
 - 65536**
 - 32768
- 11) *To run several programs apparently simultaneously on a computer, you need:*
- As many CPU or computing cores as programs that you want to run simultaneously
 - An operating system that allows multi-threading
 - An operating system that allows multi-tasking**
 - A super-computer; no personal computers or laptops can run several programs apparently simultaneously.

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12) Let A be the binary number 1100110 and B the binary number 11100010; which of these binary numbers C satisfies $A+C = B$?

- a. 1111111
- b. 111
- c. 1000000
- d. 1111100

13) What is the first step of a CPU cycle?

- a. Fetch the instruction,
- b. Clear the memory,
- c. Execute the instruction,
- d. Mix water and detergent.

14) Hummingbirds are birds that can flap their wings up to 90 times a second. What is the most appropriate sampling rate to use if you want to monitor the flight of a hummingbird correctly with a digital device?

- a. 1 Hz,
- b. 10 Hz,
- c. 100 Hz,
- d. 200 Hz.

15) Interpreters and compilers are:

- e. Word processing applications,
- f. Tests included in the POST,
- g. Programs that translate a source code written in a high-level language into machine language,
- h. Drivers for printers.

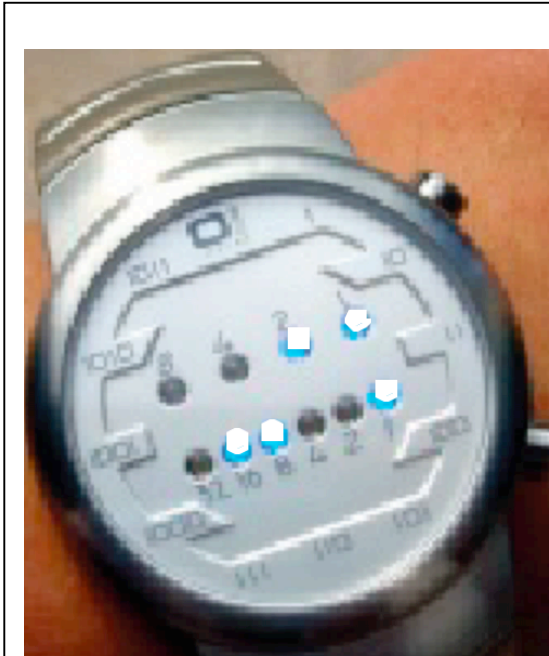
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Part II (three problems, 20 points each; total 60 points)

1) Different types of digital clocks: what time is it on the two clocks shown below?

A)



(white dots are "on")

3 hours 25 minutes

B)

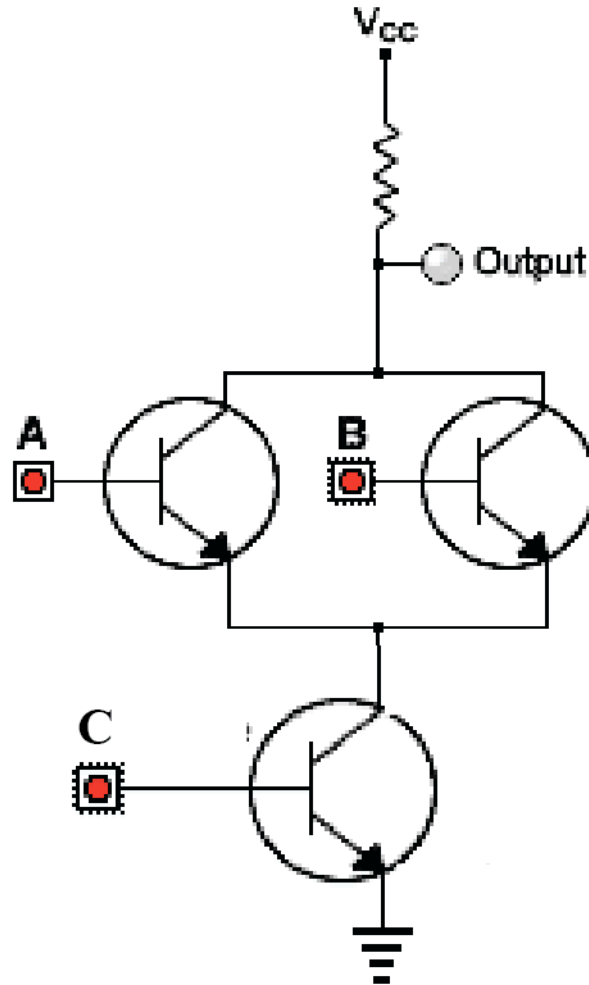
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17 hours 35 minutes 59 seconds

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2) Look carefully at the logical circuit below, and complete the table. Remember: an input of 0 means no current, while an input of one means current is on.



Input A	Input B	Input C	Output
1	1	1	0
1	1	0	1
1	0	1	0
1	0	0	1
0	1	1	0
0	1	0	1
0	0	1	1
0	0	0	1

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3) The table below lists on the left four devices that can be found inside a computer. For each of these devices, give their purpose (center column), and list in the right column what could happen if they would stop working.

Device	Purpose	Possible problem
Heat sink	Cools down the CPU	If heat sink is broken, CPU may overheat
Power supply	Provides power to all devices in the computer	Computer will not work at all
BIOS EPROM chip	Chip on which the BIOS is stored	If BIOS chip is defective, the BIOS will not run and the computer will not start
North bridge	Serves as a connector to the main buses in the computer (those corresponding to the CPU, memory, graphics card,...)	If defective, the CPU, memory, graphics card will not be connected anymore: the computer will stop working.