*Name:*_____

*ID:*_____

ECS 15: Introduction to Computers
Finals
March 19, 2010

Notes:
1) The final exam is open book, open notes.
2) You have 2 hours, no more: I will strictly enforce this.
3) The final is divided into 3 parts, and graded over 90 points (actually 100 points, 10 of which are considered extra credit 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 (20 questions, each 2 points; total 40 points)
(these questions are multiple choices; in each case, find the most **plausible** answer)

1) *An example of an **input device** is*
   a. The printer,
   b. The CPU,
   c. The keyboard,
   d. The monitor.
Printer and monitor are output devices; the CPU is neither input nor output

2) *A **MAC address** can be found on:*
   a. The back of your MacBook laptop,
   b. A NIC card,
   c. The graphics card,
   d. The CPU fan
The MAC address is the hardcoded address of a Network Interface Card (NIC)

3) *One main advantage of a **solid state drive** compared to a **regular hard drive** is:*
   a. It does not require power
   b. It has a much larger capacity (several petabytes)
   c. It has no moving parts so it is less fragile
   d. It does not require cables as it works wirelessly

4) *CPUs in computers are covered with a **heat sink** to:*
   a. Dissipate the heat they release
   b. Make them look pretty
   c. Protect them from shocks (for example if the computer falls)
   d. Isolate them from the other devices to avoid interferences

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5) *In Python, if you write:*

A="6"

B=4

C=A+B

*The **value of C** is:*
      a. 10
      b. 64
      c. "64"
      d. Undefined, and you get a syntax error

Python does not know how to add an integer and a string

6) *In Python, if you write:*

A="6"

B=4

C=A*B

*The **value of C** is:*
      a. 24
      b. 64
      c. "6666"
      d. Undefined, and you get a syntax error

When you multiply a string with an integer N, Python interprets it as you would like N copies of the string

7) *Which of the following are **NOT executed by the BIOS** (check all that applies):*
      a. Run POST tests
      b. Start drivers for devices attached to the computer
      c. Print a test page on the printer
      d. Load the operating system

The BIOS does run the POST tests and load the operating system. Its does not print a test page on the printer nor does it start the derivers for the devices (this is the operating system that does that).

8) *Which of the following **does NOT refer to memory**?*
      a. EPROM
      b. RAM
      c. ROM
      d. GPU

RAM is Random Access Memory, ROM is Read Only Memory while EPROM is Erasable-Programmable-Read-Only-Memory. The GPU is a processor specific to the graphics card.

9) *Which is the following is **NOT a set for character encoding**?*
      a. ASCII

    b. Unicode
    c. VSLI
    d. Extended ASCII

ASCII, Unicode and Extended ASCII are three characters encoding; VSLI is an invented acronym…

10) *What is the* **World Wide Web***?*
    a. A computer game
    b. An operating system
    c. A part of the internet that enables information sharing
    d. The internet

11) *Assume that you are preparing a term paper and you want to use the Web as a source of information.* **Which of the following statement is TRUE?**
    a. You are free to copy information you find on the Web and include it in your paper
    b. You do not have to cite the Web sources you use for your paper
    c. You should never consult the Web when you are working on a paper
    d. Just like print sources, Web sources must be cited in your paper. You are not free to plagiarize information you find on the Web.

12) *Which one of the following is most probably* **NOT** *an example of an extension in a URL?*
    a. .com
    b. .edu
    c. .npr
    d. .gov

".com" is for commercial sites, ".edu" is for University and education sites, ".gov" is for government sites. NPR is a radio station….and is not used as an extension!

13) *How can you catch a computer virus?*
    a. Sending e-mail messages
    b. Using your computer during winter
    c. Shopping online
    d. *Opening an e-mail attachment*

Computer viruses are small programs; you will get them from a document that comes on your computer…such as an e-mail attachment!

14) *Which binary number comes right after the binary number 101111?*
    a. 101112
    b. 101110
    c. 111111
    d. 110000

15) *In Python, if you write the instruction: A = (5/3)*(3/2) you will get:*
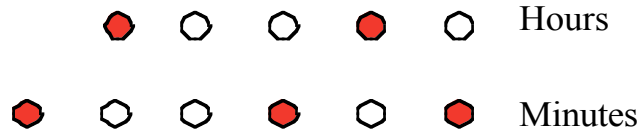   a. A=2.5
    b. A=2
    c. A=3

d. A=1

Python performs the division of integers (long division) if the numbers are integers; (5/3) gives 1, so does (3/2) and therefore the final result is 1.

16) *What time is it on this digital clock (filled circle mean "on")?*

⬢ ⬡ ⬡ ⬢ ⬡ Hours

⬢ ⬡ ⬡ ⬢ ⬡ ⬢ Minutes

    a. 10:37
    b. 18:37
    c. 10:41
    d. 18:41

17) *You want to store a movie on your computer. You know that your movie is 2 hour long, that it was filmed at a rate of 25 frames per second and that you need 10 kilobytes to store each frame. How much space to you need to store the whole movie, in megabytes (assuming that 1 megabyte = 1000 kilobytes)?*
    a. 1.8 megabytes
    b. 1,800 megabytes (=1.8 GB)
    c. 180,000 megabytes (=180 GB)
    d. 36,000 megabytes (=3.6 GB)

*The total space required is: 2 (hours) * 3600 (second/hour) * 25 (frames per second) * 10,000 (bytes per frame) in bytes, which gives 1,800 mb = 1.8 GB; a DVD can store up to 5GB.*

18) *What is the largest number (unsigned integer) that can be stored on one byte?*
    a. 255
    b. 256
    c. 128
    d. 127

19) *After running this Python command, what is the value of A, assuming the input was 1.8?*
A=int(raw_input("Enter the value of the variable A -> "))
    a. 1.8
    b. 1
    c. "1.8"
    d. 2

The real answer was "undefined"; I gave 2 points to everyone.

20) *Firefox and Internet Explorer are:*
    a. Two different browsers used on the Internet
    b. Two word processors that can be used on the Internet
    c. Two programming languages
    d. Two different types of modem to connect to the internet

Part II (three problems, 10 points each; total 30 points)

1) For each category on the left in the table below, provide four examples on the right.

Category	Examples
Input/Output device	Many options: keyboard, monitor, speakers, microphones, stylet,…
Storage device	Again, many option: hard drive, USB keys, CDs, DVDs, blu ray disks, portable hard drives,…
Alternatives for internet connection at home	Modem, cable, powerline, ADSL, wireless,…
Internet applications	"Applications" was vague…it could mean software or usage. I allowed for both.
Compiled programming languages	Fortran, C, C++, Pascal, Ada, Cobol,…

2) The table below contains invalid or ambiguous Python expressions on the left. For each of these expressions, give the correct expression on the right.

Incorrect	**Correct**

Sorting a list:
A = [1,4,3,2,6]
B=A.sort()
print "The sorted list is :",B
	The command "sort" sorts in place, and B will contain nothing. There are two options:
	1) A.sort()
	    print "The sorted list is:",A
	2) B=sorted(A)
	    print "The sorted list is",B

Get the first element of a list: L=[1,4,3,2,6] A=L[1]	*Python starts counting from 0… the first element is therefore:* A=L[0]
Input a list of integers: String=raw_input("Enter your list of integers") Numbers=String.split(",")	*Raw_input gives a string; splitting this string will give a list of strings; we still need to convert this list to a list of integers:* Numbers=map(int,Numbers)

Test if a number is even:
If N/2 == 0:
        print "The number ",N," is even
	We do not want to check if the quotient of N divided by 2 is 0, rather if the remainder of that division is 0:
	
	if N%2 ==0:
	    Print "The number",N,"is even"

Compute the sum all elements in a list:
L = [1,2,5,3,2]
Sum=0
for value in L:
        Sum=value
	When I write Sum=value, I erase the old value and replace it with "value"; instead, I want to add "value":
	
	for value in L:
	        Sum=Sum+value

3) The Python module written below reads in an integer number N given by the user and checks if it is "perfect" (A number N is perfect if it is equal to the sum of its divisors, excluding itself; for example, N=6 is perfect: its divisors are 1,2 and 3 and 1+2+3=6). Unfortunately, as written, this program does not work. It contains 5 mistakes, either simple typos or conceptual. Please find all these mistakes:

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```
N=raw_input("Enter the integer number -> ")

Sumdivisor = 0
for factor in range(0,N):
        if  N/factor = 0 :
                Sumdivisor = Sumdivisor+factor

If Sumdivisor == N
        print "The number ",N," is perfect"
```

The errors are: 1) raw_input gives a string that needs to be converted to an integer
2) we only check the factors from 1 to N (N not included); we cannot divide by 0-> range(1,N)
3) We need the remainder of the division of N by factor: N%factor
4) When we compare two numbers, we use "==" and not a single "=": N%factor ==0:
5) At the end of an if line, we need a semi-column: if Sumdivisor == N:
  (note that there was a typo: If should be if.
The correct program is:

```
N=int(raw_input("Enter the integer number -> "))

Sumdivisor = 0
for factor in range(1,N):
        if  N%factor == 0 :
                Sumdivisor = Sumdivisor+factor

if Sumdivisor == N:
        print "The number ",N," is perfect"
```

Part III. (two problems, 15 points each; total 30 points)

1) Write a small Python module that:
- Reads in a list of N integers given by the user
- Removes the smallest number and compute the average of the remaining numbers
- Prints the average

For example, if the numbers are 4,3,5 and 1, we remove 1, and compute the average of the numbers 4,3 and 5, which is 4.
One solution is:

```
# Read the list of integers:
#
string=raw_input("Enter your list of integers : ")
l=string.split(",")
numbers=map(int,l)
#
# Sort the list of numbers:
#
numbers.sort()
#
# Remove the smallest one
#
del numbers[0]
#
# Compute average of the remaining numbers
# (we need to be careful not to divide the sum of the numbers with the length if both numbers are
#  integers; the easiest is to convert the sum into a float):
#
N=len(numbers)
Sum=0.0                 # This makes the Sum a float!
For values in numbers:
        Sum=Sum+values
Average=Sum/N
#
# Print the average:
#
print "The average is: ",Average
```

2) Write a Python module that:
- Reads in an integer number N with N between 0 and 9999
- Compute M, the reverse of the number N
- Prints the original number N and the reversed number M, both as integers

For example, if N=1234, then M = 4321

This was easy!
```
#
# Read the number as a string
#
N=raw_input("Enter your number")
#
# Reverse the string:
#
M=N[::-1]
#
# Print the solutions:
#
print "The original number is",N
print "The reversed number is",M
```