Name:_____

ID: _____

ECS 15: Introduction to Computers
Finals
December 5th, 2011

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 100 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) *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

2) *Which is the following is NOT a set for character encoding?*
   a. ASCII
   b. Unicode
   c. VSLI
   d. Extended ASCII

3) *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.

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

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

6) **1024 bits correspond to N bytes, where N is:**
   a. 8192
   b. 128
   c. 1000
   d. 10

7) **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

8) **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

9) **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

10) **The binary representation of the hexadecimal 95 is**
    a. 1011001
    b. 1011111
    c. 10010101
    d. 149

11) Which of the following can be found on a computer motherboard (check all that applies)

    a. North bridge
    b. PCI bus
    c. Power supply
    d. South bridge

12) You want to store a movie on your computer. You know that your movie is 2 hour long. It was filmed at a rate of 25 frames per second and each frame requires 10 kilobytes of storage. The sound track was stored in stereo, recorded at 50KHz, with 2 bytes per point. How much space is needed to store the whole movie and its sound track, in megabytes (assuming that 1 megabyte = 1000 kilobytes)?

    a. 2520 megabytes (=2.52 GB)
    b. 3240 megabytes (=3.24 GB)
    c. 1440 megabytes (=1.44 GB)
    d. 1800 megabytes (=1.8 GB)

13) Why of the following does NOT contain an ALU (check all that applies)

    a. CPU
    b. RAM
    c. EPROM
    d. GPU

14) Which of the following is NOT true about Python:

    a. Python is an interpreted language
    b. A free version of Python can be found at www.python.org
    c. Python considers integer and real numbers as being the same type
    d. Python comes with a free development environment, IDLE

15) One of these four sentences would NOT be considered as a proposition in Logic:

    a. All cats are white
    b. An apple is not a fruit
    c. 2+4 = 8
    d. Close the door

16) Which of the following are NOT executed by the BIOS (check all that applies):

    a. Run the POST tests
    b. Start drivers for devices attached to the computer
    c. Print a test page on the printer
    d. Load the operating system

17) What is the largest number (unsigned integer) that can be stored on one bit?

    a. 255
    b. 256
    c. 128
    d. 1

18) You want to store an electronic copy of a book on your computer. This book contains 500 pages; each page contains (on average) 60 lines, and each line contains 60 characters (again, on average), including space. Each character needs 2 bytes of storage. How much space do you need to store this book?
   a. 3.6 Mbytes
   b. 36 Mbytes
   c. 360 kbytes
   d. 360 Mbytes

19) Python has two main types of variables for storing arrays: lists, and tuples. The main difference between these two types is:
   a. Lists can contain at most 10 values, while tuples can be as large as needed
   b. Tuples can only contain texts, while lists can contain any types of data
   c. List can be modified, while tuples, once created, are protected and cannot be modified
   d. Tuples can be modified, while lists, once created, are protected and cannot be modified

20) One of these terms commonly refers to prewritten programs that are permanently stored in Read Only Memory (ROM):
   a. Hardware
   b. Software
   c. Firmware
   d. Romware

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
Storage device	Hard drive CD USB key DVD
Memory	RAM ROM EPROM EEPROM
Interpreted programming languages	Python Perl Matlab Java
Instructions in the Fetch/Execute cycle	Instruction Fetch Instruction Decode Data Fetch Instruction Execute
Basic operations performed within the ALU	And Or Add Mult

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

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Incorrect	Correct
Get the first element of a list L: L=[1,4,3,2,6] A=L[1]	In Python, first element is a position 0: A = L[0]
Input a list of integers NL: String=raw_input("Enter your list of integers") NL=String.split(",")	Split generates a list of strings…we need to convert these elements into numbers using map: L = String.split(",") NL = map(float,L)
Sort a list of numbers L in decreasing order: L.reverse() L.sort()	The commands are correct…but not in the correct order! L.sort() L.reverse()
Encrypt a sentence contained in A by replacing all "a" with "t" and all "t" with "a": B = A.replace("a","t") C = B.replace("t","a")	Need an intermediate step: B = A.replace("a","A") C = B.replace("t","a") D = C.replace("A","t")

Compute the sum of all elements in a list:
L = [1,2,5,3,2]
Sum=0
for value in L:
    Sum=value
	Sum=value means that at the end of the loop, Sum contains the last element of the list L.
	We need:
	Sum = 0
	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:

```
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 number N (N>5)
- Finds the sum S of all numbers smaller or equal to N that are multiple of 3 or 5
- Print S
For example: N = 10, the numbers 3, 5, 6 and 9 are multiple of 3 or 5, and their sum S is 23.
N = 15, the numbers 3, 5, 6, 9, 10, 12, 15 are multiple of 3 or 5, and their sum S is 60.

```
N = int(raw_input("enter your number (N>5): "))

Multiple3 = range(3,N+1,3)
Multiple5 = range(5,N+1,5)
Multiple15 = range(15,N+1,15)

Sum3 = sum(Multiple3)
Sum5 = sum(Multiple5)
Sum15 = sum(Multiple15)

Sum = Sum3 + Sum5 – Sum15

print "The sum of the multiples of 3 or 5 below N is ",Sum
```

2) Write a Python module that:
- Reads in an integer number N with N between 0 and 9999
- Compute S, the sum of its digits

For example, if N=1234, then S = 1 + 2 + 3 + 4 = 10; if N = 395, then S = 3 + 9 + 5 = 17

```
N = int(raw_input("Enter the number N : "))

Nthousand = N/1000
R = N%100

Nhundred = R/100
R2 = R%100

Nten = R2/10
Nunit = R2%10

Sum = Nthousand + Nhundred + Nten + Nunit

Print "The sum of the digits is : ",Sum
```