CSE-1520R
Test #2

Sur / Last Name:
Given / First Name:
Student ID:

- **Instructor:** Parke Godfrey
- **Exam Duration:** 45 minutes
- **Term:** Winter 2011

The exam is closed book, closed notes, and no aids such as calculators, cellphones, etc.

There are five parts, each with questions. Points for each question are as indicated. Each question is multiple choice, true/false, match, or fill in the blank, as indicated.

For multiple choice, choose the *one* best answer. There is no negative penalty for a wrong answer. Assume that any number you see is in decimal (base 10), unless it is clear otherwise.

The test is out of 50 points.

Marking Box	
1.	/14
2.	/14
3.	/ 6
4.	/10
5.	/ 6
Total	/50

1. (14 points) **Operating Systems**

a. (4 points) TRUE / FALSE

i. Process Control Blocks (PCBs) are not necessary for preemptive scheduling. _____

ii. On a single CPU machine, only one process is actually executing at any single instance. _____

iii. For preemptive scheduling, round robin has been proved to be the best. _____

iv. An operating system needs to be implemented entirely in hardware. _____

b. (2 points) Paging necessitates
A. that no process is too big, memory-wise.
B. preemptive scheduling.
C. batch scheduling.
D. round-robin scheduling.
E. Microsoft Windows.

c. (2 points) The operating system is responsible for all the following *except*
A. interacting with the peripheral devices.
B. scheduling processes on the CPU.
C. performing the computation for each process.
D. mapping process images in main (or virtual) memory.
E. interrupting processes on events (in a preemptive system).

d. (2 points) Virtual memory is a technique that
A. makes it seem we have more secondary memory (e.g., hard-disk) than we actually do.
B. allows more processes to be running than there is actually space in main memory.
C. is used to implement the bus.
D. is only used with more than one CPU.
E. is only used for gaming applications.

e. (4 points) MATCH (You can use the same match more than once, and some none.) For each, state where it resides.

i.	the presently executing process	_____	**A.** in main (or virtual) memory
ii.	programs not running	_____	**B.** on hard-disk
iii.	most processes's PCBs	_____	**C.** in the CPU
iv.	an inactive spreadsheet file	_____	**D.** on the bus

2. (14 points) **Architecture**

a. (4 points) TRUE / FALSE

i. The most prominent computer architecture today is known as the *von Neumann* architecture. _____

ii. The speed of light is critical in today's computer architecture designs. _____

iii. Moore's Law is a prediction—which has held true for half a century—that the number of transistors on CPUs would double every two years. _____

iv. Typical modern CPUs use less energy than typical CPUs from a decade ago. _____

b. (2 points) An electron travelling at (nearly) the speed of light travels approximately how far in one nano-second?

A. 3 centimetres
B. 30 centimetres
C. 3 metres
D. 300 metres
E. 30 kilometres

c. (2 points) The Intel Core 2 Duo CPU has around how many transistors?

A. 29,000
B. 290,000
C. 2,900,000
D. 29,000,000
E. 290,000,000

d. (6 points) FILL IN THE BLANK

i. The components that are written as program code and executed are called _____.

ii. The physical components of a computing system (that one can "touch") are called _____.

iii. Data is moved between main memory and the CPU on the _____.

iv. Special memory locations (storage units) on the CPU where the *program counter* and such are stored are called _____.

v. The part of the CPU that executes the logical operations of a process is the _____.

vi. An example of an input device is a _____.

3. (6 points) **Database Systems**

a. (2 points) A relational database system provides beyond a spreadsheet program all the following *except*

A. better protection of permanence of data.
B. concurrent access to many users.
C. scalability to very large sets of data.
D. a tabular model for data.
E. schema support for more complex schemas that involve multiple tables.

b. (4 points) FILL IN THE BLANK

i. A collection of logically related tables is called a _____.

ii. A field (or group of fields) that uniquely determine a tuple (a row) is called a _____.

iii. The "R" in the E-R modelling language stands for _____.

iv. The most prevalent query language for relational database systems is _____.

4. (10 points) **Functions and Simulations**

a. (2 points) A model is
   A. a simulation.
   B. an abstraction of a real system.
   C. hardware not yet implemented.
   D. a game, rather than reality.
   E. a device to connect to the Internet over the telephone lines.

b. (4 points) FILL IN THE BLANK
   The following refer to Microsoft Excel.
   i. What would `=0 <> 1` return?

   ii. What is a function that tests whether a value is a *number*?

   iii. Write a function that checks value Mark and returns "A" if Mark >= 90, but returns "E" otherwise.

   iv. Write a function that checks value Mark and returns "A" if Mark >= 90, returns "B" if Mark >= 80, but returns "E" otherwise.

c. (4 points) Consider the following Excel spreadsheet named **Pricelist**.

	A	B
1	**Item**	**Price**
2	cookies	$4.37
3	ice cream	$4.90
4	spinach	$3.39
5		

Column **A** has been named Item, and **B**, Price.

On another spreadsheet in the same workbook, you have a column named Basket which represents a shopping basket of items.

You add to the column next to Basket a new column Cost. In Cost, you want to find the Price of the item in Basket from **Pricelist**.

Write a formula for this to attach to Cost.

5. (6 points) **Circuits**

a. (4 points) Consider the S-R latch in Figure 1.

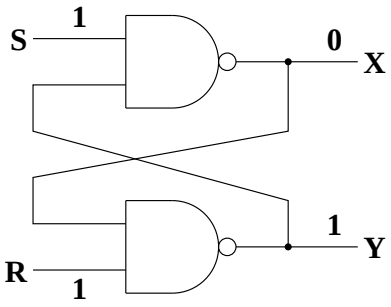

Figure 1: S-R latch.

i. What is an S-R latch an example of, a *combinational* or a *sequential* circuit? _____

ii. To "flip" this to $X = 1$ and $Y = 0$, you would need to set momentarily what to what? _____

iii. *True* or *False*: An S-R latch is an example of volatile memory. _____

iv. An S-R latch stores how much information? _____

b. (2 points) A multiplexer (*mux*) is a circuit that
A. multiplies two binary integers.
B. chooses one of its many inputs as its output.
C. adds many binary integers simultaneously.
D. selects among multiple CPUs.
E. drives more than one display on a single computer.

Scratch space.

Relax. Breathe. Turn in your test.