CS 271 Computer Architecture and Assembly Language
Self-Check for Lecture #2
Solutions are posted

1. Terms / Definitions
    a. "caching" is _____.
    b. A "bus" is _____.
    c. "vonNeumann architecture" refers to computer architectures that _____.

2. Inside the computer, machine instructions, memory addresses, numbers, characters, etc., are all represented as _____.

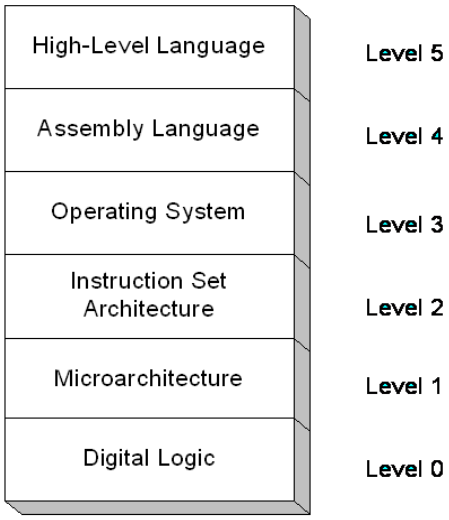
3. In the simple CISC architecture discussed in Lecture #2, which register holds
    a. the current machine instruction? _____.
    b. the current micro-instruction? _____.

4. Number the order of steps in the instruction execution cycle.

    _____ Decode the instruction in the Instruction Register.
    _____ If the instruction requires memory access, determine the memory address, and fetch the operand from memory into a CPU register, or send the operand from a CPU register to memory.
    _____ Increment the Instruction Pointer to point to next instruction.
    _____ Execute the instruction.
    _____ Fetch the instruction at the address in the Instruction Pointer into the Instruction Register.
    _____ Repeat from step 1.

5. Consider the virtual machine levels in the diagram at the right. At each level (except 0 and 5), an interpreter accepts an instruction from the level above, converts the instruction to its own language, and passes the resulting instructions to the level below. Note that Level-0 has no interpreter; the instructions from the Micro-architecture level are sent directly to the hardware.

    Suppose that the interpreters at each level (levels 1 - 4) generate *n* instructions in order to represent one instruction from the level above. Suppose also that each Level-0 instruction executes in *c* nanoseconds.



    a. How long does it take to execute a Level-3 instruction? _____ ns.
    b. How long does it take to execute a Level-5 instruction? _____ ns.