CS 3220: Quiz #0

1. Are you definitely taking the course (Yes/No)?

Yes. It's been my dream for years. This course will change my life.

2. Describe the von Neumann model of computing in three sentences.

The von Neumann model of computing has four components: (1) memory (RAM), (2) ALU: arithmetic logic unit, (3) Control Unit, (4) Input/Output devices. Items (2) and (3) constitute the CPU. In this model, the program and the data are stored in the memory and instructions of the program executes sequentially.

3. What is the Amdhal's Law?

If we speedup a fraction of the code (foptimized) with the Speedupoptimized, the total speedup will be calculated based on the following formula:
Total Speedup = 1/(foptimized/Speedupoptimized + (1-foptimized)/1)

4. What is the current paradigm of general-purpose processor design? What are two possible paths forward when current paradigms of general-purpose design fails? How do these paths relate to CS 3220?

Multicore processors.
(1) Approximate computing and (2) application-specific hardware design. CS3220 is about the latter paradigm. We will also learn some of the concepts in approximate computing throughout the course.

5. What is Dark Silicon?

Dark silicon is the fraction of chip that needs to be powered off at all time due to power constraints.

6. Based on Dennard's theory of scaling, what is a transistor?

A 2-dimensional voltage-controlled switch

7. What is an Instruction Set Architecture (ISA)?

An instruction set, or instruction set architecture (ISA), is **the interface between the hardware (processor) and software (compiler)**. The ISA defines what is exposed to the software from hardware and provides and abstraction for the software to operate the hardware. The ISA defines the native data types, instructions, registers, addressing modes, memory architecture, interrupt and exception handling, and external I/O. An ISA CS 3220: Quiz #0 Name: Department
includes a specification of the set of opcodes (machine language), and the native commands
implemented by a particular set of processors.

8. What is a cache and how is it different than a register file?

A cache is an onchip memory that is **hidden from the software** and is not part of the architectural state and is completely managed by hardware.
Register file and scratch pad are also on chip memory that are **exposed to the software** and are managed by software. Register file is also a part of the architectural state.

9. Write the recursive implementation of the Fibonacci series in any programming language.

```
int Fibonacci(int n) {
if (n = =1) return 1;
if (n == 2) return 1;
return Fibonacci(n – 1) + Fibonacci(n-2); }
```