CS 286-001 Computer Architecture & Organization
Summer 2019
Quiz #9 on August 2, 2019 (SOLUTIONS)

Your Last Three Digits: ________________
(please do NOT write all of your student ID or your name)

Grade: ______

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(1) What are the four hardware architecture for “parallel computers”?
   ① Tightly-Coupled Multi-Processor System
   ② Functionally-Specialized Multi-Processor System
   ③ Loosely-Coupled Multi-Processor System
   ④ Distributed Systems

(2) What are “medium-grained tightly-coupled multi-processor systems”?
   Medium-grained tightly-coupled multi-processor systems are parallel computers that assign
   processing units to threads (“thread-level parallelism”).

(3) If a fine-grained tightly-couple multi-processor system consists of two or four processors (or
    processor cores), its performance usually will not achieve two or four times better performance
    (execution speed) compared to its single-processor counterpart. What is the major cause of the
    problem?
       Data dependency limits the number of the processing units that can be active at a time.
(4) Which Flynn’s parallel model does Intel core 5 multi-core processor belong to?

Intel’s Pentium Core-5 processor is a MIMD parallel computer.

(5) Using a single-core SISD processor, what is the algorithm complexity (execution time) for performing an $N^2$ matrix multiplication? What is the algorithm complexity (execution time), if an SIMD processor (with an infinite number of processing units) is used?

SISD: $N^3$

SIMD: $\log_2 N$