CS 4750/5750	**Cloud Computing**	Test 1
Name:	Fall 2017	Max Pts: 56

Important: This is an open book test. You can use any books, notes, or paper but no electronic device. *Do not log into the computer during the test, or use any electronic or communications device. Change your cell phones to silent mode.* Any calculations and rough work can be done on the back side of the test pages. You will lose five points for not writing your name.

1. [10 pt] Consider a multicore processor with four heterogeneous cores labeled A, B, C, and D. Assume core B is twice as fast as core A, core C is twice as fast as core B, and core D is three times faster than core A. Assume that all four cores start executing the following application at the same time and no cache misses are encountered in all core operations. Suppose an application needs to compute the square of each element of an array of 1024 elements. Assume 1 unit time for core A o compute the square of an element. Thus, core B takes $\frac{1}{2}$ unit time, core C takes $\frac{1}{4}$ unit time, and core D takes $\frac{1}{3}$ unit time to compute the square of an element. Given the following division of labor in four cores:

Core	Number of elements
A	128
B	128
C	512
D	256

   (a) Compute the *total execution time* (in time units) for using the four core processor to compute the square of 1024 elements in parallel. The four cores have different speeds. Some faster cores finish the job and may become idle, while others are busy computing until all squares are computed.

   (b) Calculate the *processor utilization rate*, which is the total amount of time the cores are busy (not idle) divided by the total execution time they are using all cores in the processor to execute the above application.

2. [6 pt] Explain the difference between CAPEX and OPEX models in corporate IT departments.

3. [10 pt] Under what circumstances should you prefer to use PaaS over IaaS? Explain with an example.

4. [6 pt] What is the difference between a legacy data center and a private cloud? What can an organization gain by using private cloud instead of a legacy data center?

5. [6 pt] What is stateless cloud architecture? How does it compare with legacy application architecture?

6. [6 pt] Business and technical requirements are used as one of the aspects to justify moving into the cloud. Can you give an example of an application that will favor staying as a legacy application? Explain your answer.

7. [6 pt] What is throttling? What is gained (or lost) by its use?

8. [6 pt] What is the difference between ACID and BASE transactions? Explain with an example.