

CS-301 Computer Architecture Assignment 1

Name: _____

1. **(11 points)** Answer the following:

a. How many milliseconds (ms) are in 1 second?

b. How many microseconds (μ s) are in 1 second?

c. How many nanoseconds (ns) are in 1 millisecond?

d. How many microseconds are in 1 millisecond?

e. How many nanoseconds are in 1 microsecond?

f. How many kilobytes (KB) are in 1 gigabyte (GB)?

g. How many kilobytes are in 1 megabyte (MB)?

h. How many megabytes are in 1 gigabyte?

i. How many bytes are in 20 megabytes?

j. How many kilobytes are in 2 gigabytes?

k. By what order of magnitude is something that runs in nanoseconds faster than something that runs in milliseconds?

2. The technologist's notion of Moore's Law is that the number of transistors per chip doubles approximately every 18 months. In the 1990s, Moore's Law started to be described as the doubling of microprocessor power every 18 months. Given this new variation of Moore's Law, answer the following:

a) **(4 points)** After successfully completing CS-301, you have a brilliant idea for a new chip design that would make a processor six times faster than the fastest one on the market today. Unfortunately, it will take you four and a half years to save the money, create the prototype, and build a finished product. If Moore's Law holds, should you spend your money developing and producing your ship or invest in some other venture? Justify your answer.

b) **(5 points)** Suppose we have a problem that currently takes 100,000 hours of computer time using current technology to solve. Which of the following would give us the solution first: (1) Replace the algorithm used in the current solution by one that runs twice as fast and run it on current technology, or (2) Wait 3 years, assuming Moore's Law doubles the performance of a computer every 18 months, and find the solution using the current algorithm with the new technology? Justify your answer.
