# CS 430
# Problem Set #3

Date assigned: Wednesday, October 3, 2012
Date due: Wednesday, October 10, 2012
Points: 50

1) (15 pts) Consider a 64-Mbyte main memory that is byte-addressable and an 8-Kbyte cache (excluding the tag field). If the block size is 16 bytes, answer each of the following questions:

a) Show how a main memory address is broken up into Tag, Line, and Word using a direct-mapped cache.

b) Given a), where in the cache would the decimal address 200000 map? Show all work for full credit.

c) Show how a main memory address is broken up into Tag and Word in an associative cache.

d) Given c), where in the cache would the decimal address 200000 map? Show all work for full credit.

e) Show how a main memory address is broken up into Tag, Set, and Word in a 4-way set associative cache.

f) Given e), where in the cache would the decimal address 200000 map? Show all work for full credit.

g) How much additional space is needed in the cache to store the Tag field for: (1) a direct-mapped cache, (2) an associative cache, (3) a 4-way set associative cache.

2) (10 pts) In your own words, define "spatial locality" and "temporal locality" and then work problem 4.15 on p. 150.

3) (10 pts) Work problem 5.3 on p. 182


4) (5 pts) Work problem 10.7 on p. 361

5) (5 pts) Work problem 10.8 on p. 361

6) (5 pts) Can an example of overflow occur when adding an n-bit positive and negative 2's complement number? If so, give an example. If not, show for all cases that this is not possible.

Note1: Please make sure your problem sets are typed, answered in order, and stapled together.

Note2: A hard copy of your Problem Set Solution is due on the instructor's desk by 11:45am on the day the assignment is due. Also, place a copy of this solution 03PUNetID.pdf in the CS430 Drop Box by 11:45am on the day in which the assignment is due.

Note3: I don't mind you talking about particular problems at a very high level (not a specific solution level) and even lending resources of where more information can be found. Further, all of your solutions are to be original and in your own words. If you have any questions, let me know.