**Quiz 6**

**ECE 486/586 Spring 2020**

Name: Student Number:

Consider the characteristics of a memory system given below.

Main memory size = 2048 bytes (aspect ratio = 2048 x 8)

Cache size = 256 bytes (aspect ratio = 256 x 8)

Cache line/block size = 16 bytes

**1)** How many address lines are needed for this system if a 2-way set associative organization is used? (5 points)

log2 2048 = 11

11 address bits are needed

**2)** List the three parts (i.e. fields) of each memory address and the number of bits associated with each field if a 2-way set associative organization is used. (5 points)

Offset = 4

Index = 3

Tag = 4

**3)** Assume the CPU must reference main memory byte location 130. What main memory block contains this location? (5 points)

130/16 = 8.125 = mm blk # 8

**4)** Assume the CPU must reference main memory byte location 130. What cache block(s) must be searched to determine if the memory reference is a hit or miss for a 1-way set associative organization? (5 points)

130/16 = 8.125 = mm blk # 8

mm blk #8 % 16 cm sets = 8 = cm blk to search

Cache block 8

**5)** Assume the CPU must reference main memory byte location 226. What cache block(s) must be searched to determine if the memory reference is a hit or miss for a 2-way set associative organization? (5 points)

226/16 = 14.125 = mm blk # 14

mm blk #14 % 8 cm sets = 6 = cm set to search 🡪 cm blks 12 - 13

Cache blocks 12 and 13