Solution Hints Memory Module Assignment 1

1. Which block of main memory does 1200 byte belong? (Floor 1200/16, since 16 bytes/block given)

In direct mapping where does a block of main memory get placed in cache? ((Main memory block number) Mod (Total Cache blocks)

1. -How many sets in cache? ( 27/22)

-Which block number of main memory contains 1200 word? (Floor 1200/16=75; Note that 1200 is the 1st word of block 75 of main memory (say 1215 will be the last word of block 75 of main memory)

-Which set of cache will get block 75 of main memory? (75 MOD (Total number of sets in cache)

= 11

* What are the block-numbers belonging to the 11th set of cache? (11 set x 4 blocks/set= block44, block 45,block46, block 47)
* So 1200 word of main memory is placed in one of the above 4 blocks.

1. What is the Size of address in bits ? ( log 2 256MB =? **Or** 256MB = 2? )

Direct Mapping:

* + How many bits for word off-set in a block? (128= 2?)
  + How many bits to identify a cache block ? ( Number of cache blocks =1M/128= 2?)
  + How many bits needed for TAG ? ( Total address in bits – (bits for word-offset + bits for cache block-id) **OR**  (Total number of blocks in main memory)/(Total number of blocks in cache) )

Fully Associative Mapping

* How many bits for word off-set?
* How many bits for TAG? ( (Total address size in bits) – (number of bits for word off-set))

Set Associative Mapping

* How many bits for word off-set in a block?
* How many blocks in cache?
* How many sets in cache? How many bits required to identify a set (set-id)?
* How many bits in TAG? ((Total number of blocks in memory)/(Total number of sets) **OR** (Total address size in bits) – (Number of bits required for set-id + number of bits needed for word off-set)