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)
2. -How many sets in cache? ($2^7/2^2$)
   -Which block number of main memory contains 1200 word? (Floor 1200/16=75; Note that 1200 is the 1^{st} 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 11^{th} 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.
3. 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)