1. Suppose a direct-mapped cache has 16 bytes blocks and a total of 128 blocks. The machine has 64 bits addresses

- How many address bits are used for the byte offset (Word)?

16 bytes blocks -> need 4 bits for byte offset (2^4 = 16)

- How many address bits are used for the index (Line)?

128 blocks -> 128 sets (direct-mapped) -> need 7 bits for index (2^7 = 128)

- How many address bits are used for the tag?

64 bits – 4 bits – 7 bits = 53 bits for tag

2. Now suppose the cache is 4-way set associative. Answer again:

- How many address bits are used for the byte offset (Word)?

16 bytes blocks -> need 4 bits for byte offset (2^4 = 16)

- How many address bits are used for the index (Set)?

sets = 128 blocks/ 4 blocks = 32 sets -> need 5 bits for index (2^5 = 32)

- How many address bits are used for the tag?

64 bits - 4 bits – 5 bits = 55 bits for tag