Due at the beginning of recitation R13 on Wednesday October 24.

A) Given a cache with the following parameters, specify which bits of a 32 bit memory address are used for the block offset, which bits for the index (or set selection) and which bits are used for the tag.

- Cache size: 256 data words
- Block size: 16 words
- Associativity: 2-way

Block Size = 16 words = 16 * 4 Bytes = 64 bytes \(\Rightarrow\) Memory Byte-addressable: **Offset 6 bits**

Numbers of total lines across all ways: \((\text{Cache Size})/(\text{Block Size}) = 256 / 16 = 16\) lines
- 2-way Cache: **8 lines per each way** ( = 8-set cache) \(\Rightarrow\) **3 bits for Index**

Remaining bits for tags: 32 – 3 – 6 = 23 bits

- Block offset bits: 6
- Index bits: 3
- Tag bits: 23

B) How many sets are in the cache of problem A?

- 8 lines per each way: 8-set Cache

- **Number of sets: 8**

C) Determine the number of bits in **each set** of the cache. Make sure to account for a valid bit, a tag, and all of the data words in each way of the set.

In each set, we have 2 ways (columns).
- Each line in each way has: a valid bit (1-bit), tag bits (23-bit) and a Block (64 Bytes = 64*8 bits)

Thus, total number of bits in “each set” is \(2 \times (1 + 23 + 8\times64) = 1072\) bits

- **Bits per set: 1072**