

TUTORIAL 5

1. The memory unit of a computer has 256K words of 32-bit each. The computer has an instruction format with four fields: an operational code field, a mode field to specify one of seven addressing modes, a register address field to specify one of 60 processor registers, and a memory address. Specify the instruction format and the number of bits in each field if the instruction is in one memory word.
2. A computer has 32-bit instructions and 12-bit addresses. If there are 250 two-address instructions, how many one-address instructions can be formulated?
3. An address space is specified by 24 bits and the corresponding memory space by 16 bits.
 - a. How many words are there in address space?
 - b. How many words are there in memory space?
 - c. If a page consists of 2K words, how many pages and blocks are there in the system?
4. A digital computer has a memory unit of $64K \times 16$ and a cache memory of 1K words. The cache uses direct mapping with a block size of four words.
 - a. How many bits are there in the tag, index, block, and word fields of the address format?
 - b. How many bits are there in each word of cache including a valid bit?
 - c. How many blocks can the cache accommodate?