Memory Systems

**Part A** Many PCs today have 16 million address memory systems with 8 bit words (bytes). Suppose they are built using one million address by four bit word DRAM memory chips. Answer the following questions about the memory systems design.

- How many address lines does the memory system require? ________________________________
- How many data lines does the memory system require? ________________________________
- How many address lines does the DRAM memory chip require? ____________________________
- How many memory chips are required for the system? _________________________________
- What kind of address decoder is required? _______ to _______

**Part B** A new memory part is now available, a **four million** address by **four bit** word DRAM chip. Reconsider the design if this chip is used to build the same memory system.

- How many address lines does the DRAM memory chip require? __________________________
- How many memory chips are required for the system? _________________________________
- What kind of address decoder is required? _______ to _______

**Part C** The original IBM PC introduced in 1980 was socketed for **16 thousand** address by **one bit** word DRAM memory chips. Reconsider the design if this chip is used to build the same memory system.

- How many address lines does the DRAM memory chip require? __________________________
- How many memory chips are required for the system? _________________________________
- What kind of address decoder is required? _______ to _______