**Review questions chapter 4**

|  |
| --- |
| 1. **What are the differences among sequential access, direct access, and random access?**   Sequential access is accessing data in a specific linear sequence (example: tapes).  Direct access has the data address based on a physical location.  With random access, any location can be selected at random, and the addressable locations in memory have a unique, physically wired-in addressing mechanism.   1. **What is the general relationship among access time, memory cost, and capacity?**   As access time becomes faster, the cost per bit increases. As memory size increases, the cost per bit is smaller. Also, with greater capacity, the access time becomes slower.   1. **How does the principle of locality relate to the use of multiple memory levels?**   Slower and less expensive memory is used in higher stages, with the most expensive being the registers in the processor as well as cache. Main memory is slower, less expensive, and is outside of the processor.   1. **What are the differences among direct mapping, associative mapping, and set-associative mapping?**   Direct mapping maps each block of main memory into only one possible cache line.  Associative mapping permits each main memory block to be loaded into any line of the cache.  The set-associative mapping combines both methods while decreasing disadvantages. The cache consists of a number of sets, each of which consists of a number of line.   1. **For a direct-mapped cache, a main memory address is viewed as consisting of three fields.  List and define the three fields.**   i is the cache line number j is the main memory block number m is the number of lines in the cache   1. **For an associative cache, a main memory address is viewed as consisting of two fields. List and define the two fields.**   Tag and Word fields.  The Tag field uniquely identifies a block of main memory.  The Word is what is to be placed in the block of memory. |