1. Main memory is not suitable for permanent program storage because it is usually too small to store all needed programs and data. Another reason main memory is not suitable is because it is volatile, which means, the contents are lost when the power is turned off.
2. An interrupt vector is an array or table of addresses that is then indexed by a unique number, given in interrupt request, to provide the address of the interrupt service routine for the device.
3. The purpose of an interrupt is for a hardware mechanism to notify the cpu that it needs attention while also maintaining priority. This allows the cpu to efficiently handle the queue of requests. An interrupt is a hardware mechanism used to notify the cpu of a task that needs attention, whereas, a trap is a software interrupt that can be caused by an error or by a specific request from a user program. Yes, traps can be generated by user programs, a few examples would be to catch division errors or to call operating system routines.
4. Multi-core processing is more efficient than placing each processor on its own chip mainly because the communication speed between processors is much faster than that of processors on separate chips. Another advantage to multi-core processors is that a single multiple processor chip uses much less power that multiple single processor chips.