Assignment 5 Solution

4.1. After reading the input data, it is necessary to clear the input status flag before the program begins a new read operation. Otherwise, the same input data would be read a second time.

4.3. 7CA4, 7DA4, 7EA4, 7FA4

4.4. A subroutine is called by a program instruction to perform a function needed by the calling program. An interrupt-service routine is initiated by an event such as an input operation or a hardware error. The function it performs may not be at all related to the program being executed at the time of interruption. Hence, it must not affect any of the data or status information relating to that program.

4.5. If execution of the interrupted instruction is to be completed after return from interrupt, a large amount of information needs to be saved. This includes the contents of any temporary registers, intermediate results, etc. An alternative is to abort the interrupted instruction and start its execution from the beginning after return from interrupt. In this case, the results of an instruction must not be stored in registers or memory locations until it is guaranteed that execution of the instruction will be completed without interruption.

4.6. (a) Interrupts should be enabled, except when C is being serviced. The nesting rules can be enforced by manipulating the interrupt-enable flags in the interfaces of A and B.

(b) A and B should be connected to $INTR_2$, and C to $INTR_1$. When an interrupt request is received from either A or B, interrupts from the other device will be automatically disabled until the request has been serviced. However, interrupt requests from C will always be accepted.

4.27. A larger distance means longer delay for the signals traveling between the processor and the input device. Primarily, this means that $t_2 - t_1$, $t_3 - t_2$ and $t_5 - t_3$ will increase. Since longer distances may also mean larger skew, the intervals $t_1 - t_0$ and $t_4 - t_3$ may have to be increased to cover worst-case differences in propagation delay.

In the case of Figure 4.24, the clock period must be increased to accommodate the maximum propagation delay.