From RTS 93 Final Exam

Problem 1: A real time system generates five events. Details of the respective interrupts and their handlers are described in the incomplete table below. Complete the table. (25 pts)

Interrupt Name	Strong Priority	Weak Priority	Frequency	Duration	Load	Loading Factor	Loaded Duration	Maximum Duration	Latency
A	3	3	100 kHz	1 μs					
B	3	2	50 kHz	3 μs					
C	3	1	30 kHz	5 μs					
D	2	1	100 Hz	11 μs					
E	1	1	0.5 Hz	10 ms					

From RTS 92 Midterm Exam

Problem 2: A processor has an interrupt system that uses a combination of strong and weak priority. There are five event types, A through E. Event type A uses strong priority level 3; within any 20 μs interval event A will occur no less than 5 times and no more than 10 times. The handler duration is 1 μs. Event B requests an interrupt of strong priority 2 and will occur at 100 kHz; the duration of its handler is 2 μs. Events C, D, and E each request interrupts of strong priority 1. Event C has weak priority 3, occurs at 100 Hz, and its handler has a duration of 1 ms. Event D has weak priority 2, occurs at 20 Hz, and its handler has a duration of 3 ms. Event E has weak priority 1, occurs at 5 Hz, and its ISR has a duration of 2 ms. For each interrupt compute maximum latency, actual duration, and loading factor. (34pts)

Based on RTS 92 Final Exam

Problem 3: A processor has an interrupt system that uses strong priority. There are three event types, A through C. Event A requests an interrupt of strong priority 3, occurs at 100 kHz, and its handler has duration 2 μs. Event B requests an interrupt of strong priority 2, occurs at 700 Hz, and its handler has duration 90 μs. Event C requests an interrupt of strong priority 1, occurs at 300 Hz, and its handler has duration 2 ms.

For each event compute maximum latency, response time, and loading factor. (25pts)

Based on a RTS 92 Homework

Problem 4: A real time system uses five events, names A to E. The computer uses both strong and weak priority. Event A occurs at a frequency of 15 Hz and its handler has a duration of 1 ms; interrupt B occurs at a frequency of 50 kHz and its handler has a duration of 3 μs; interrupt C occurs at a frequency of 1 Hz and its handler has a duration of 100 ms; interrupt D will occur no less than 500 ms after itself, its handler has a duration of 20 ms; and interrupt E occurs at a frequency of 100 kHz and its handler has a duration of 3.5 μs. The handlers for interrupts E and B cannot be interrupted; the maximum acceptable latency for interrupt C is 1.5 ms, the maximum acceptable latency for interrupt A is 50 ms. The acceptable latency for interrupt D is very large.

Assign each interrupt a priority level (so that the system functions properly) and compute the latency, actual run time, and response times.

From RTS 92 Midterm Exam

Problem 5: Answer all of the following. Please be brief; long but correct answers will not receive full credit.

Part 1: In class conventional operating system scheduling was discussed. Why was that scheduling not adequate for RTS? How could the scheduling be modified for RTS use? (11 pts)

Part 2: In a RTS what can be done in the event a task will not complete on schedule? (11pts)

Part 3: Is it good to thoroughly test a large system? A small system? Explain. (11 pts)