EE 4770 **Homework 5** **Due: 1 May 1995**

Problem 1: Design a scheduling algorithm which ensures that over a relatively long interval CPU time is divided evenly between all tasks. For example, consider a system running this algorithm with two tasks, one I/O bound, the other compute bound. The run time of the tasks is long compared to the interval. The I/O-bound task and the CPU-intensive task would each get 50% of the CPU time (unless the time to complete I/O requests is very large).

- Describe the algorithm either in pseudocode or prose.
- Draw a timeline showing task states and CPU activity for an OS using your algorithm. The timeline should show a case in which your algorithm splits time evenly while a conventional algorithm (*e.g.*, first come, first served) would not.

Problem 2: Find timing constraints for the code in the self-balancing washing machine example. Briefly justify each constraint. Show how the code might be scheduled, including interrupt handlers and tasks. Show a situation in which there might be timing difficulties and explain how they might be resolved. *Note: Solving this problem requires estimation of code run times and timing constraints. Not enough information has been given to determine exact answers. A great deal of time would be needed for exact answers, as well as techniques will beyond the scope of this course. Therefore, do your best with the information presented in class and your knowledge of computer engineering.*

Problem 3: Find the actual run time, latency, and response time for the event types described in the table below.

Event Name	Strong Pri.	Weak Pri.	Handler Run Time	Occurrence
A	3	3	$10\,\mu$s	Periodic, $t_b(A) = 54\,\mu$s.
B	3	2	$4\,\mu$s	Twice, any time between occurrences of A.
C	3	1	$12\,\mu$s	Once, any time between occurrences of A.
D	2	1	$50\,\mu$s	Periodic, $t_b(D) = 23$ ms.
E	1	1	$10\,\mu$s	One shot.

Note: event B will not recur until after a previous occurrence of event B has been responded to. That is, there cannot be an occurrence of B after an occurrence of B and before the response for this occurrence of B.

Events A and C occur the same number of times, B occurs twice as many times as A and C.