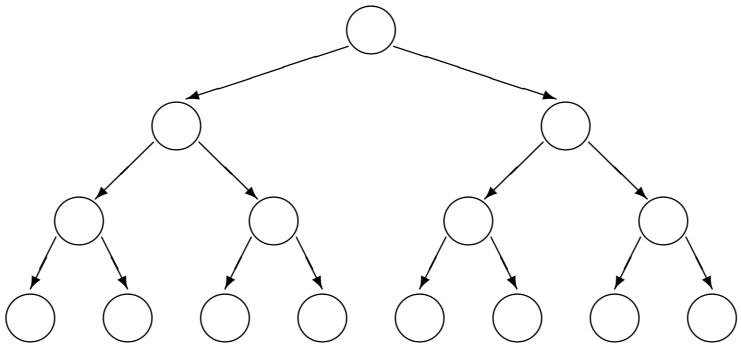
INF3380 Exercise Set 3

Exercise 1

There are n equal tasks and P workers. Suppose n is not divisible by P. How to divide the n tasks among the P workers in a fair way?

Exercise 2



The above figure shows 15 tasks, each taking 10 minutes to be carried out by one worker. (Using more workers on the same task won't save any time.) Each arrow in the above figure means that the task being pointed cannot start before the pointing task has finished. What will be the shortest time for 4 workers to finish all the 15 tasks? Repeat the same question for the case of 3 workers.

Exercise 3

Suppose there is a 2D rectangular uniform mesh, which has M points in the x-direction and N points in the y-direction. Please describe in detail how to

carry out a checkerboard block decomposition of the mesh into $P \times Q$ blocks, as evenly as possible. Note that M may not be divisible by P, and N may not be divisible by Q.

Exercise 4

Given a task that can be divided into m subtasks, each requiring one unit of time, how much time is needed for an m-stage pipeline to process n tasks?

Exercise 5

If we denote by T_{pipe}, which is found in the above exercise, the time required to process n tasks using a m-stage pipeline. Let us also denote by T_{seq} the time needed to process n tasks without pipelining. How large should n be in order to get a speedup of p? (Hint: Speedup is defined as $\frac{T_{\text{seq}}}{T_{\text{pipe}}}$.)