Homework 2 (due Oct 4, 2004)

(10 points each)
From Quinn’s Book

Exercise 3.1 (page 90)
Give an example of how increasing processor utilization increases interprocessor communication.

Exercise 3.6 (page 91)
Illustrate how to perform a reduction in \([\lg n]\) communication steps for the following values of \(n\): 7, 11, 21.

Exercise 3.9 (page 91)
Many parallel algorithms require a broadcast step in which one task communicates a value it holds to all of the other tasks
   a. Using the task/channel model described in this chapter 3, devise an efficient parallel algorithm implementing broadcast.
   b. Prove that the algorithm you devised in part (a) has optimal time complexity.

Exercise 4.6 (MPI program, page 112)
Write a parallel program variant of Kernighan and Ritchie’s classic “hello, world” program [61]. Each process should print a message of the form
   \textit{hello, world, from process }<i>\textit{ where }<i>\textit{ is its rank.}

\textit{Nothing is fancy here for this problem. The main point is making sure you set your account correctly to run MPI programs.}

\textit{To get credits for this problem, email your source code to me at wchantam@cs.kent.edu by the due date. Please make the emails’ subject line as PDC_HW2_yourname.}

Exercise 5.1 (page 134)
Consider a simple block allocation of \(n\) data items to \(p\) processes in which the first \(p - 1\) processes get \(\left\lfloor n/p \right\rfloor\) items each and the last process gets what is left over.
   a. Find values for \(n\) and \(p\) where the last process does not get any elements.
   b. Find values for \(n\) and \(p\) where \(\left\lfloor p/2 \right\rfloor\) processes do not get any values. Assume \(p>1\).