

# MPI: Homework

## Write the following MPI programs:

**Hello World:** A program that starts MPI running on a number of processors, and then writes out “Hello” from each processor, stating the processor rank and the size of the comm world.

**Simple send-receive:** A program that simply sends some data from one processor to another, using the standard MPI send and receive. Print out what was sent and what was received to make sure it works.

**Ping-pong:** A program that sends data backwards and forwards between two processors.

**Latency:** A program to time message transfers of various size messages. Put a loop around your ping-pong and use MPI\_WTIME to time the message transfers. From this data, figure out what the constants are for the formula  $T_{\text{comm}} = t_s + t_w L$  on your machine of choice.

**Ring:** A program that sends data around a ring of processors -- shift all data to the left or shift all data to the right or both.

**Pi:** A program to figure out  $\pi$  by the “dartboard method” in parallel  
A circular dartboard on square background has a ratio of the areas  
 $= \pi r^2 / (2r)^2 = \pi/4$   
If we throw darts randomly at the dartboard, and examine whether they fall in the circle or not, we can figure out this ratio and therefore estimate  $\pi$ .  
Do this in parallel!

