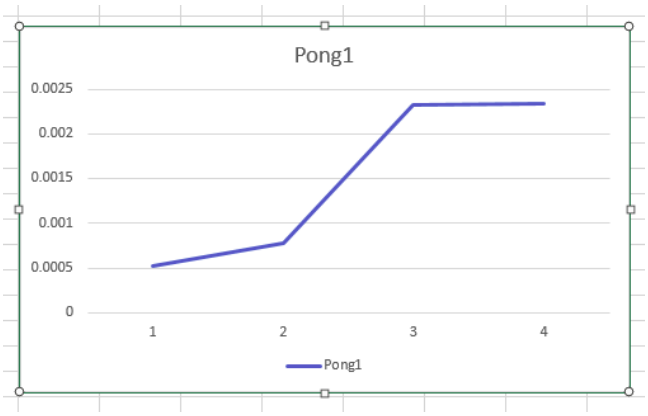
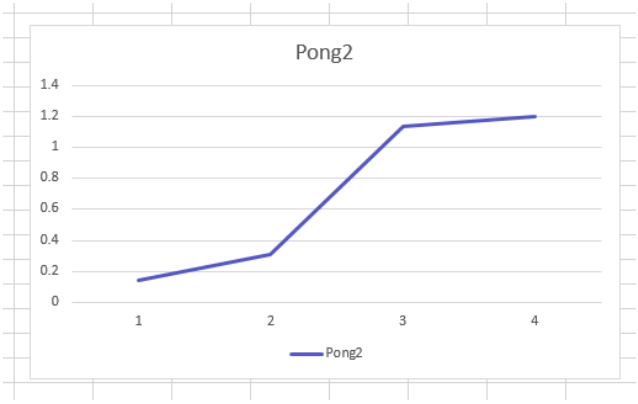
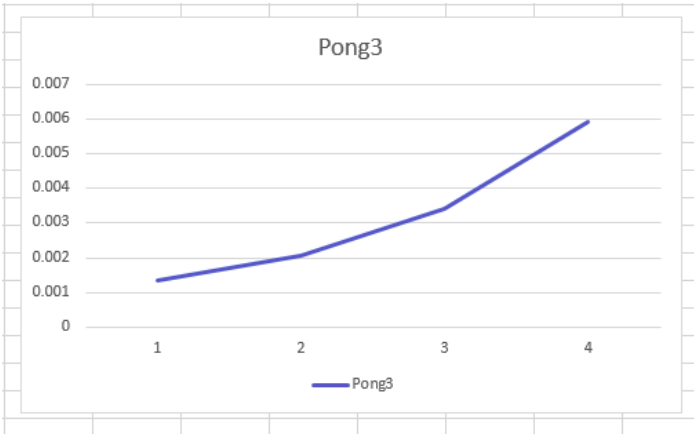
Clayton Glenn
Parallel Programming
HW4 Problem 1
March 1st, 2019

The Graph of the 3 programs are as follows from the beginning and ending of the program by way of MPI_Wtime function.





The pingpong2 program that sends each individual element is much slower since the objects being passed through the comm is not just one object like pingpong1 program, but 2^10 : 2^13 objects which makes the program send and receive many more times which slows the program.



The point to point communication is faster from one process to another, however, point to point communication for pingpong3 would be 8*pong1Times. This is where broadcasting to the collective processes is faster than individual communication. Broadcasting is slower because the broadcast has to be sent to each individual process instead of being streamlined to a single process, where behind the scenes blocking can occur and slow the program.