# September 22nd, 2015 Pre-Class Questions

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## Question 0

I have been running behind on the pre-class questions, and started these on September 23rd.

## Question 1

I'm somewhat confused by how futures work, but that seemed like more of a side note in the slides than a critical concept or anything.

## Question 2

### (2a)

Let's suppose that we run a Monte Carlo simulation with $N$ the number of trials, $p$ the number of processors, ($t_{trial}$) the time per trial , and ($t_{update}$) the time to update the global counters in the critical section . Let us also suppose that we are using a batch size of $b$.

Then the total amount of time spent running the trials will be:

$$\frac{N}{p}t_{trial}$$

While the total amount of time spent updating will be:

$$\frac{N}{b}t_{update}$$

therefore the total execution time will be:

$$\frac{N}{p}t_{trial} + \frac{N}{b}t_{update}$$

This is a rather simplistic model, and doesn't do very well in the limit as the batch size $b$ approaches the problem size $N$, where a lot more than $N$ trials might be run before the code checks for convergence.

**(2b)**

I couldn't get my code to run correctly on the cluster right now, I will update this later when I get it to work.

**(2c)**

Based on my model, you are best off picking a very large batch size. As mentioned before, my model is rather simplistic and falls apart when considering large $b$, as in this case you may be doing a lot more than $N$ trials. So the best choice of $b$ should be one that is large, but still small enough compared to $\frac{N}{p}$ that you will not have to do too many extra trials. In fact, if you know $N$ and $p$ beforehand, you could use this to automatically choose a batch size that is large, but still small relative to $\frac{N}{p}$.

## Question 3

I modified the `workq` files as can be seen in this repository. I ran my code on the cluster and it seemed to work as expected.