CS 115 Computer Simulation, Assignment #2 – Train Unloading Dock (again)
Due Thu 9 Feb at beginning of class

In this assignment, you will write a simulation of a train unloading dock. The system being modeled is *exactly* the same as that described in assignment 1, except this time you will write your simulation in a special-purpose simulation language. I recommend using **CSIM** but I do not demand it; if you have another special-purpose language you'd like to try, please consult with me and we can discuss it.

The input and output specifications remain the same; I would like to be able to run your code with various parameters, and see the output myself. Output the same list of statistics at the end of your simulation as specified in Assignment #1. You should use separate CSIM random number streams for each of the four conceptual process streams (train arrivals, train unloading times, remaining crew time, replacement crew travel time).

The grading guidelines (*i.e.,* "pretty" source code, correct simulation, brief but thoughtful write-up) also remain the same. The late penalty is the same, and you submit both electronically (using the Unix "submit" command as before) and on paper.

In addition, you will compute two more statistics in (or at least from) your simulation(s):

a) Compute the 95% confidence interval for the mean time-in-system, based upon 10 runs of the simulation.
b) Compute the mean time-in-system to an accuracy of 10%, with 95% confidence. How many runs did it take to compute this? (That is, keep re-running your simulation, each time with a different seed, until your 95% confidence interval has a width which is less than 10% of the value of the mean time-in-system.)

These statistics can be computed by hand by running your simulation many times, or, if you are clever, it can all be done with a little extra coding inside CSIM. See the functions **reset, permanent_table, table_mean, report, report_table,** and the part of the CSIM User Manual discussing confidence intervals. If you do it this way, please ensure that the **default** action of your simulation is to run on the command line just as the input specification was for Assignment #1---I don't want it to run 10 batches of runs when I type "./train 7200 10". (On the other hand, don't think you've managed to skip having to learn the details of confidence intervals; I'm sure to ask about it on the midterm.) Note also that if you do it this way, you might get different numbers than if you do separate simulations and combine them by hand, because in the former case you won't start with an empty queue at the beginning of each batch, but in the latter you will.

Extra credit (20% bonus): Verify that your system overloads at the same rate of train arrivals as your first assignment. If it does not, explain why not (which means that at least one of your simulations is wrong). Include evidence of the above in your write-up. In addition, extend your paper-and-pencil analysis of the previous assignment so that it works for an arbitrary average unloading time (the average unloading time in the previous assignment was 4 hours). Then, use your analysis to compute the maximum non-overloaded train arrival rate for average unloading times of 5 and 10 hours, and then verify your analysis by simulation. Include your analysis and a report of your results in your write-up.