Suppose we sell a particular beverage at a sports event. The beverage costs us $2 per gallon, and we sell it at $16 per gallon. We are unable to replenish our inventory during the event. If there is any leftover inventory at the end of the event, we can sell it for $1 per gallon. From past experience, we believe the demand for the beverage during the game is exponentially distributed with a mean of 1000 gallons. How much inventory should we order and have on hand at the beginning of the event?

To help you decide on how much to order, we have written a simulation in excel, which you can download from the course web site. The simulation allows you to estimate the profits you would have made using two different policies. Initially, the simulation orders 800 gallons under policy 1; under policy 2, 900 gallons. The columns show the ordering, revenue, salvage, and profits for policy 1 and policy 2. The last column shows the difference in the profits between the two policies, i.e., profit under policy 1 minus profit under policy 2.

The rows correspond to different runs of the simulation. Currently, the simulation is set up to run 5 different times (rows 5 through 9). To re-run the simulation and see 5 new runs, simply hit F9.

Cell B11 has the sample mean of the demand over those 5 runs. The true mean of the demand is 1000 gallons. Generally, you will notice that the sample mean based on a sample size of 5 is far from 1000, and the standard deviation will be large. You will probably find the simulation easier to use if you increase the number of rows corresponding to runs from 5 to something larger. Use the copy and paste functions to increase the number of rows. Hit F9 a few times. Observe the sample means and standard deviations while hitting F9 several times; this should help you to decide on the number of rows.

By watching cell K11 (or K? if you increase the number of rows) while you hit F9 several times, you can probably come to a conclusion whether policy 1 or policy 2 is more profitable on the average. If cell K11 is typically positive, policy 1 is better. If so, and if policy 1 has 800 while policy 2 has 900, you might try changing 900 to a smaller value.

By changing the amounts in cells a2 and g2, you should be able to come up with a good answer to the question of how much to order.

1. How much do you recommend ordering?

2. Roughly, what is the average profit under your policy? (Include a printout from your simulation.)