Activity: the newsvendor game

Chapter 7, Single-Period Stochastic Inventory

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Work in threes. 25 minutes.

Names: _____

The kits. Each spring the distributor that stocks the mower deck belt runs a dealer promotion and buys the promotion's kit once, before the season. The packaging carries that year's promotion, so kits unsold at the end of the season are broken up and liquidated for **\$5** each. Demand for the kit in a season is normal with a mean of **100** kits and a standard deviation of **30**, independent from one season to the next. Your instructor assigns your group one of two kits:

Kit	Costs	Sells for	Liquidated for
A	\$20	\$60	\$5
B	\$45	\$60	\$5

Your kit: _____

The rules. You play ten seasons. Before each season the group agrees on an order q and writes it down; then the instructor reveals that season's demand. You may change q every season. A season's profit is $60 \times \text{sold} + 5 \times \text{left over} - \text{cost} \times q$.

Part A. Predict

Before season 1: will your group's average order over the ten seasons be above 100, below it, or about 100? Write your season 1 order and one sentence of reasoning.

Part B. Play

Leave the last column empty for now.

Season	Your q	Demand	Sold	Left over	Short	Profit	Profit at Q^*
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
Total							
Average							

Do not turn the page until season 10 is in the table.

Part C. The newsvendor's answer

1. Compute c_u, c_o and the critical ratio for your kit, then Q^*, rounded to a whole kit. You will need $\Phi(0.6046) = 0.7273$.
2. Replay the ten seasons at Q^*, on the same demands, and fill the last column. Compare the two totals, and compare your average order with Q^*.

Part D. The class

Your instructor collects each group's average order, by kit. Which way did the groups holding kit A miss Q^*, and which way did the groups holding kit B? What single pattern describes both?

Part E, if you have time. Ten seasons is a small sample

1. At 118 kits the expected shortage per season is 5.06 kits; at 82 kits it is 23.06. Compute the expected profit per season at your Q^* and compare it with the average of your last column.
2. For each season compute the profit at Q^* less the profit of ordering 100. Report the average of the ten differences and its 95% half-width, using $t = 2.262$. Do ten seasons show that Q^* beats ordering the mean?

Exit ticket (tear off and hand in)

Name: _____

1. Kit B's critical ratio is 0.27. In one sentence, what does that say about how often the best order leaves dealers unserved?

2. True or false, and why: the group with the highest total profit after ten seasons chose its orders best.