**EXAMPLE NEWSVENDOR INVENTORY PROBLEM**

**Ian MacMillian is again tinkering with his inventory policies at Ian’s Tartan Shop on the Royal Mile in Edinburgh, Scotland. Each year prior to the high tourist season, Ian places a one-time order in April for kilts with trendy patterns (such as purple plaids). If he cannot sell them in the high season, he must put them on clearance for two-thirds off in order to get rid of them. This year he pays $125 for a trendy kilt to his supplier and charges customers $225 for them during the high season. Ian talks to his marketing guru, Angus, who assigns a goodwill cost for customer alienation of only $20 because only tourists would ever buy these trendy tartans. Angus forecasts demand to be normally distributed for this year with a mean of 400 kilts and a standard deviation of 150 kilts. For this problem you can assume that each customer attempts to buy 1 kilt.**

1. **What is his optimal order quantity?**

**For reasons known only to Ian, he instead places an order for 502 trendy kilts (this may or may not be the correct answer to part A). Answer the sub-questions B-E for this order policy. (Hint: ES, ELS, FR, formulas etc. will all work even with non-optimal order quantities.)**

1. **What is the resulting probability of a stock-out?**
2. **What is the fill rate?**

**D. What is the expected leftover inventory?**

**E. Would expected profit (including goodwill costs) go up or down if Ian instead ordered the optimal quantity in sub-problem A? In one sentence, support your answer.**

**F. If Ian instead wanted to ensure a fill rate of 90%, how many kilts should he order based on Angus’s marketing information. How does this compare qualitatively (in one sentence again) with the optimal quantity from sub-problem A?**