Operation Strategy Assignment 1

due on 5/22 (Sat.) 1 p.m.

Q1. (40%)

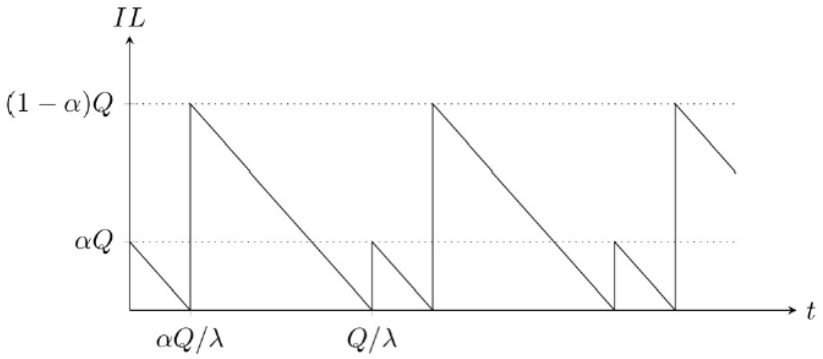
Suppose that your favorite electronics store maintains an inventory of a certain brand and model of MP3 player. The store pays the manufacturer $165 for each MP3 player ordered. Each order incurs a fixed cost of $40 in order processing, shipping, etc. and requires a 2-week lead time. The store estimates that its cost of capital is 17% per year, and it estimates its other holding costs (warehouse space, insurance, etc.) at $1 per MP3 player per month. The demand for MP3 players is steady at 40 per week.

1. (20%) Using the EOQ model, calculate the optimal order quantity, reorder point (r), and average cost per year.
2. (20%) Now suppose that backorders are allowed, and that each backorder incurs a stockout penalty of $60 per stockout per year. Using the EOQ model with planned backorders, calculate the optimal order quantity, stockout percentage (x), reorder point (r), and average cost per year. How much money would the store save per year by allowing stockouts, expressed as a percentage?
3. (Bonus, 5%) Write a Julia program to address (1.)
4. (Bonus, 5%) Write a Julia program to address (2.)

Q2. (30%)

Consider a variant of the EOQ model in which each order arrives in two separate deliveries. In particular, if we place an order of size Q, then a quantity $\alpha Q/\lambda$ years later, for a fixed constant $0 < \alpha < 1$. Thus, the inventory curve looks like the curve pictured in below.

The fixed cost K is incurred once per order cycle, even though there are two deliveries. As in standard EOQ, the holding cost is given by h per item per year. Calculate the optimal order quantity, Q^*.



Q3. (30%)

A snack bar at certain theme park sees a (constant, deterministic, continuous) demand of 150 cases per day. (We are aggregating the various products sold by the snack bar into a single product and expressing its demand in terms of number of cases.) Replenishment orders are placed to a central warehouse located within the theme park, with negligible lead time, and it costs $10 in labor costs to deliver an order to the snack bar from the warehouse. It costs $1.20 per case per day in refrigeration costs and other holding costs to hold cases of food in inventory at the snack bar.

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2. (15%) Now suppose that backorders are allowed, and that each backorder incurs a stockout penalty of $60 per stockout per year. Using the EOQ model with planned backorders, calculate the optimal order quantity, stockout percentage (x), reorder point (r), and average cost per year. How much money would the store save per year by allowing stockouts, expressed as a percentage?
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