Activity: building the exchange curve as a class

Chapter 4, Multi-Item and Constrained Systems

Manuel D. Rossetti

Work in pairs, then as a class. 20 minutes.

Names: _____

The group. Five items the storeroom buys under one carrying charge, $\gamma = 0.20$ a year, and one ordering cost k for all five. Demand is constant and known.

Item	λ_j, a year	c_j
P-1	2,000	\$20.00
P-2	900	\$25.00
P-3	4,000	\$2.50
P-4	160	\$40.00
P-5	1,440	\$2.50

Your pair's ordering cost. The instructor gives your pair a letter.

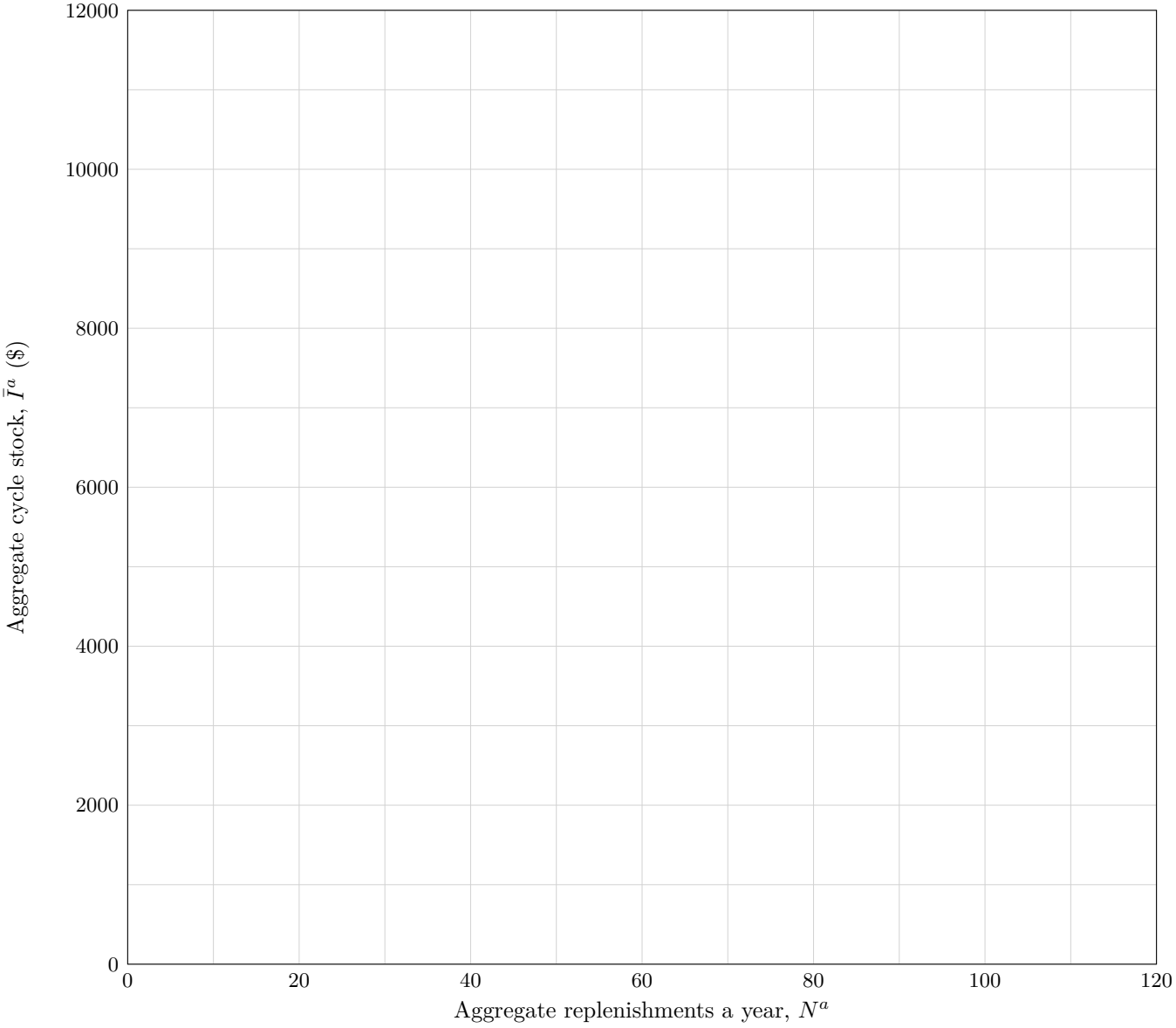
Pair	A	B	C	D	E	F
k	\$2.50	\$10.00	\$22.50	\$40.00	\$90.00	\$160.00

Part A. Predict

Pair D's ordering cost is four times pair B's. How will pair D's cycle stock compare with pair B's, and its number of orders a year?

Part B. Your point

1. For each item compute $Q_j = \sqrt{2k\lambda_j/(\gamma c_j)}$, the cycle stock $c_j Q_j/2$ and the orders a year λ_j/Q_j.
2. Sum to the aggregate cycle stock $\bar{I}^a$ and the aggregate replenishments N^a. Check: $\bar{I}^a/N^a$ must equal k/γ.
3. Post your point on the class plot, and mark every pair's point on the grid.


12000
10000
8000
6000
4000
2000
0
Aggregate cycle stock, $\bar{I}^a$ ($)
0
20
40
60
80
100
120
Aggregate replenishments a year, N^a

Part C. The storeroom's practice

The storeroom places **40** orders a year across this group and carries **$6,000** of cycle stock.

1. Is its point on the class curve? Compute $\bar{I}^a N^a$ for the curve and for the practice.
2. At 40 orders a year, how much stock does the curve need? At $6,000, how many orders? What can the storeroom gain, and what must it give up?
3. A colleague reads the practice as $k/\gamma = 6{,}000/40 = 150$. What is wrong with that reading?
4. Purchasing puts k at $40. Where on the curve should the storeroom operate, and what would it save a year in ordering plus holding cost?

Part D, if you have time. A second storeroom

Another storeroom with the same five items sits on the curve at 59 orders and $2,950. What ordering cost does its practice imply? Its purchasing department says $40 an order. Which way should it move, and what is the move worth a year?

Exit ticket (tear off and hand in)

Name: _____

1. On the curve, why can a storeroom not order more often without holding less stock?

2. True or false, and why: a storeroom above its curve must accept more orders to carry less stock.