UGBA 141
Discussion 6

Agenda:

- **Problem solving of (P,T) and Newsvendor**
- **Midterm review I : Process module**

- **Next week: Midterm review II**

Feb 25, 2022
Hansheng Jiang

Reminder

- Homework 3 due on March 2 (next Wednesday)

- Start doing practice midterm (pdf available on bcourses)
  - Hard copy solution handed out in class (last Wednesday and next Monday)

- Upcoming
  - A Discord channel will be set up for each project team
  - Guest speaker for next Monday's lecture will start at 12:30 pm (not Berkeley time)

Summary of Inventory Models

	EOQ	(Q, R)	(P, T)	Newsvendor
Replenish	Yes	Yes	Yes	No
Terms of interest	Order quantity Q	Order quantity Q Reorder point R	Period length P Target level T	Profit-maximizing quantity Q^*
Context	Constant demand and no lead time	Uncertain demand and lead time	Uncertain demand and lead time	Uncertain demand

Note: EOQ and (Q,R) reviewed in Discussion 5

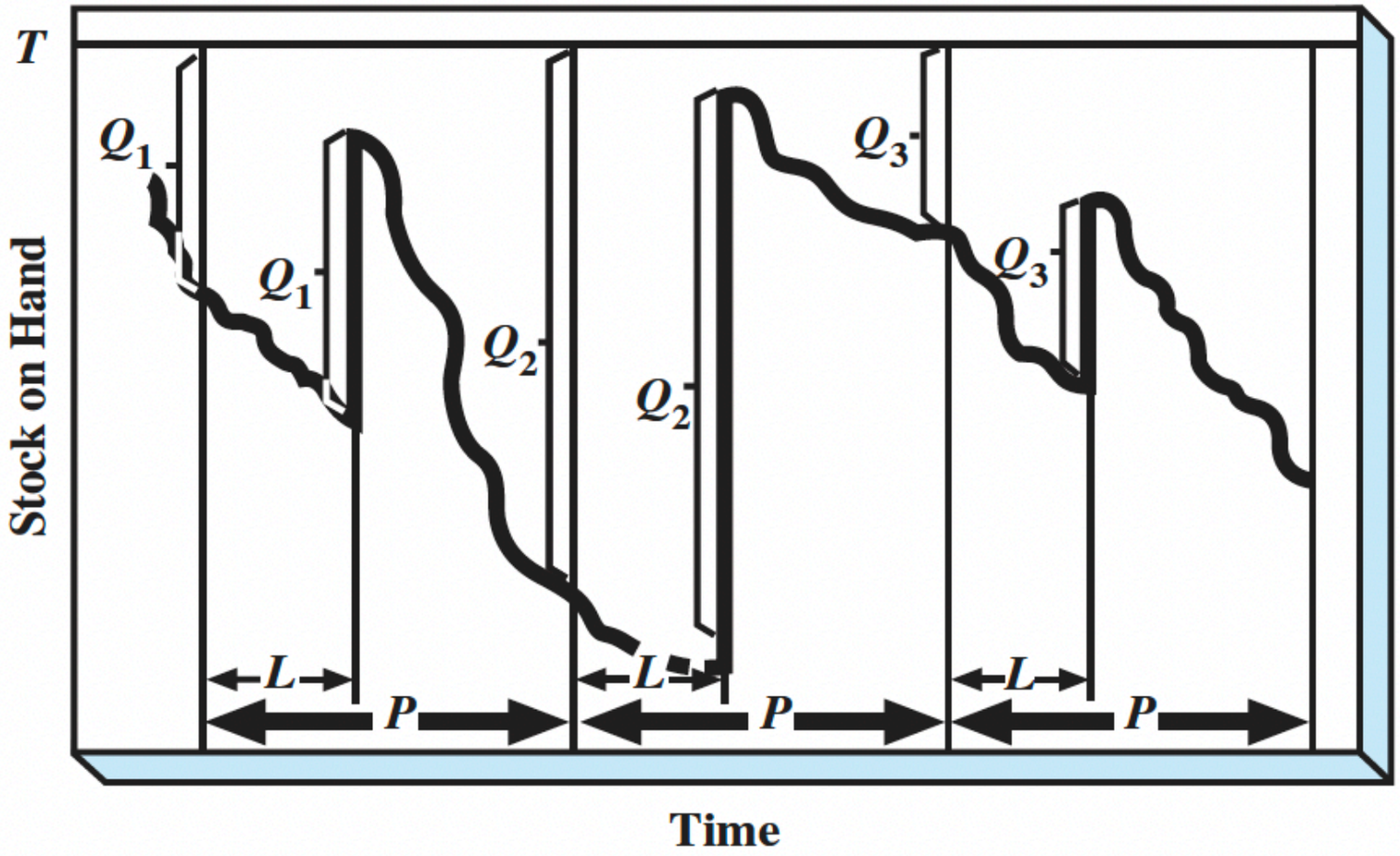
(P, T)

$$P = \frac{\text{EOQ}}{D} = \sqrt{\frac{2S}{Dh}}, T = \mu_{P+LT} + z\sigma_{P+LT}$$

μ_{P+LT} = mean demand during $P + LT$

σ_{P+LT} = demand standard deviation during $P + LT$

z = z score (from reading standard normal table)



"Order up to *T* every P periods"

Practice Problem: (P, T)

$$P = \frac{\text{EOQ}}{D} = \sqrt{\frac{2S}{Dh}}, T = \mu_{P+LT} + z\sigma_{P+LT}$$

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Problem. Consider the product described in solved problem 2 when answering the following questions:

a. How often should orders be placed for this product if they are placed at regular intervals
using a periodic review system?
b. Compute the target inventory level.
c. State the specific decision rule for this product by using the information you have calculated so far.
d. Assume it is time for a periodic review. A check of the inventory level for this product reveals that there are 60 units on hand and 110 units on order. What should be done?

Newsvendor

Critical ratio = $\dfrac{G}{G+L}$

G =gain, L = loss

Probability of $D \leq Q^*$ = critical ratio

Problem. The Johnson Shoe Company buys shoes for $40 per pair and sells them for $60 per pair. If there are surplus shoes left at the end of the season, all shoes are expected to be sold at the sale price of $30 per pair. Suppose demand is normally distributed with a mean of 500 units and a standard deviation of 100 units/season. How many shoes should the Johnson Shoe Company buy?

Midterm Review I

Process Module

- Basic metrics and how to compute them
- Advanced topics
  - Inventory buildup
  - Rework
  - Flow-dependent processing

Midterm Logistics

- Try the practice midterm to get a sense
- Most exam questions are in a similar taste as those in the homework and the practice midterm
- Some exam questions are related to *cases*
- Calculators are allowed (and necessary) but electronics such as phones/laptops/pads are prohibited — *be prepared with a standalone calculator*
- Can bring one cheatsheet (8.5" x 11”, double sided) — *make your own cheatsheet, typed or handwritten*
- Summary of formulas will be provided on the exam paper

Process Module: Knowledge Map

	Lecture Process I	Lecture Process II	Lecture Process III	Lecture Process IV
Concepts				
Practice				
Related HW1 Q				
DIS				
Case				

Process Module: Knowledge Map

	Lecture Process I	Lecture Process II	Lecture Process III	Lecture Process IV
Concepts	efficiency frontier; flow unit; process flow diagram	process capacity; bottleneck; flow rate; utilization; labor productivity (idle time, labor content, labor utilization, cost)	rework; flow unit-dependent process	cranberry case
Practice	a) identify efficiency frontier; b) read process flow diagram	a) compute capacity, flow rate, cycle time; b) compute labor productivity; c) compute time to make X units;	a) process capacity with rework; b) implied utilization in flow unit-dependent process; c) process choice	inventory buildup
Related HW1 Q		a) Q1, Q2, Q3; b) Q4, Q5, Q6, Q7; c) Q10, Q11	a) Q8; b) Q9	Q11, Q12
DIS	DIS 1	DIS 2	DIS 3	DIS 3
Case		Kristen's cookie	Beleza Natural	National Cranberry

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Process Module: Basic Metrics

- Process capacity
- Bottleneck
- Flow rate
- Cycle time
- Utilization / Implied utilization

Process Module: Basic Metrics (Cont.)

- Time to make X units
  - Steady state
  - Start with empty system
- Labor productivity
  - Labor content and Idle time
  - Labor utilization
  - Cost of direct labor

Process Module: Advanced Topics

- Inventory buildup
- Rework
- Flow unit dependent process