Periodic review models ctd.

Example: 4 periods, order $r_1 = 3$, $r_2 = 2$, $r_3 = 3$, $r_4 = 2$

$K = 2$ M\$ $\quad h = 0.2$ M\$ per plane per period

Note: when producing inventory must be zero in optimal solution.

$n=4$:

$$f_4^*(s) = \begin{cases} K = 2 & \text{if } s = 0 \\ hs = 0.4 & \text{if } s = 2 \end{cases}$$

(plus production costs per unit, but these are not relevant for finding optimal solution)

↑ state: # of planes produced previously and not yet delivered

$n=3$:

$$f_3(s, x_3) = h \cdot s + f_4(s - r_3) + K \text{ if } s = 0$$

	$x_3 = 0$	$x_3 = 3$	$x_3 = 5$	f_3^*	x_3^*
$s = 0$	—	$2 + 2 = 4$	$2 + 0.4 = 2.4$	2.4	5
$s = 3$	$3 \cdot 0.2 + 2 = 2.6$	—	—	2.6	0
$s = 5$	$5 \cdot 0.2 + 0.4 = 1.4$	—	—	1.4	0

$n=2$:

f_2

	$x_2 = 0$	$x_2 = 2$	$x_2 = 5$	$x_2 = 7$	f_2^*	x_2^*
$s = 0$	—	$2 + 2.4$	$2 + 2.6$	$2 + 1.4$	3.4	7
$s = 2$	$0.4 + 2.4$	—	—	—	2.8	0
$s = 5$	$1 + 2.6$	—	—	—	3.6	0
$s = 7$	$1.4 + 1.4$	—	—	—	2.8	0

$n=1$:

f_1

	$x_1 = 3$	$x_1 = 5$	$x_1 = 8$	$x_1 = 10$	f_1^*	x_1^*
$s = 0$	$2 + 3.4 = 5.4$	$2 + 2.8 = 4.8$	$2 + 3.6 = 5.6$	$2 + 2.8 = 4.8$	4.8	5 or 10

Two optimal schedules:

(a) produce all 10 in period 1

(b) produce 5 in period 1 and 3

} optimal total cost = 4.8 M\$

↑ highlights above trace this solution.

The newsvendor problem

- Single perishable product (today's newspaper)
- single time period
- at end of period, product has "salvage value"
- no initial inventory
- single decision variable: # of items to stock
- demand is a random variable

Information:

c: unit cost of product

h: holding cost (cost of storage − salvage value)

p: shortage cost (lost revenue, lost good-will)

Amount sold: $\min\{D, y\}$

$$G = cy + p \max\{0, D-y\} + h \max\{0, y-D\}$$