Daipark_ch1

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차 례

Exercise 9. 2
Exercise 10 3

Exercise 9.

a) uniform distribution from 10 to 15 cameras a month. If 12 cameras are ordered at the beginning of a month, what are the expected overstock cost and the expected undercost or shortage cost? What is the expected total cost?

$$
\begin{aligned}
C_o &= cost - salvage \\
&= inventory\,holding\,cost + wholesale\,cost \\
&= 480 + 25 - 0 = 505 \\
C_u &= price - cost \\
&= retail\,price + special\,delivery\,charge - wholesale\,cost \\
&= 600 + 50 - 480 = 170
\end{aligned}
$$

$$
\begin{aligned}
\mathbb{E}[(12-D)^+] &= \int_{10}^{12} (12-x)^+ \frac{1}{5} dx + \int_{12}^{15} (12-x)^+ \frac{1}{5} dx \\
&= \frac{14}{5} \\
\mathbb{E}[(D-12)^+] &= \int_{10}^{12} (x-12)^+ \frac{1}{5} dx + \int_{12}^{15} (x-12)^+ \frac{1}{5} dx \\
&= \frac{1}{2}
\end{aligned}
$$

Expected over cost = $505 \times \frac{14}{5}$ = 1414
Expected under cost = $170 \times \frac{1}{2}$ = 85
Expected total cost = 1414+85= 1499

b) What is optimal number of cameras to order to minimize the expected total cost?

$$
\begin{aligned}
y^* &= \frac{x-10}{15-10} = \frac{67}{125} \\
&= 12.68 = 12
\end{aligned}
$$

c) Assume that the demand can be approximated by a normal distribution with mean 1000 and standard deviation 100 cameras a month. What is the optimal number of cameras to order to minimize the expected total cost?

$N(\mu, \sigma^2) = N(1000, 100^2)$

```
qnorm(0.25185,mean=1000,sd=100)
```

```
## [1] 933.1321
```

Exercise 10

a) What is the optimal ordering quantity for each case when the demand is discrete with $Pr\{D = 500\} = Pr\{D = 800\} = 1/8$, $Pr\{D = 600\} = 1/2 and Pr\{D = 700\} = 1/4$?

$C_u = 100(shortage\ cost)$
$C_0 = 50(the\ solvent\ cost(40) + disposal\ charge(10))$
$F(D) \geq \frac{100}{100+50}(\frac{2}{3})$

d	500	600	700	800
$\mathbb{P}[D = d]$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$
$\mathbb{P}[D \leq d]$	$\frac{1}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{8}{8}$

$$F(500) = \tfrac{1}{8}(0.125) \quad < \tfrac{2}{3}(0.66)$$
$$F(600) = \tfrac{1}{8} + \tfrac{1}{2} = \tfrac{5}{8}(0.625) \quad < \tfrac{2}{3}(0.66)$$
$$F(700) = \tfrac{1}{8} + \tfrac{1}{2} + \tfrac{1}{4} = \tfrac{7}{8}(0.875) \quad > \tfrac{2}{3}(0.66)$$
$$F(800) = \tfrac{1}{8} + \tfrac{1}{2} + \tfrac{1}{4} + \tfrac{1}{8} = \tfrac{8}{8}(1.0) \quad > \tfrac{2}{3}(0.66)$$

The optimal order quantity $y^* = 700$

b) What is the optimal ordering policy for arbitrary initial inventory level m? (You need to specify the critical value m^* in addition to the optimal order-up-to quantity y^*. When $m \leq m^*$, you make an order. Otherwise, do not order.)

m(prepared inventory) is 0, 100, 300, 500 and 700
d(demand) is 500, 600, 700, 800

d	500	600	700	800
$\mathbb{P}[D = d]$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$
$\mathbb{P}[D \leq d]$	$\frac{1}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{8}{8}$
$(D - m)^+(m = 0)$	500	600	700	800
$(D - m)^+(m = 100)$	400	500	600	700
$(D - m)^+(m = 300)$	200	300	400	500
$(D - m)^+(m = 500)$	0	100	200	300
$(D - m)^+(m = 700)$	0	0	0	100
$(m - d)^+(m = 0)$	500	600	700	800
$(m - d)^+(m = 100)$	0	0	0	0
$(m - d)^+(m = 300)$	0	0	0	0
$(m - d)^+(m = 500)$	0	0	0	0
$(m - d)^+(m = 700)$	200	100	0	0

c) Assume optimal quantity will be orderd. What is the total expected cost when the initial inventory m = 0? what is the total expected cost when the initial inventory m = 700?

Daipark_ch1.Rmd

```r
"Hello"
```

```
## [1] "Hello"
```