1.

Item	Usage	Unit Cost	Usage x Unit Cost	Category
4021	50	$1,400	$70,000	A
9402	300	12	3,600	C
4066	40	700	28,000	B
6500	150	20	3,000	C
9280	10	1,020	10,200	C
4050	80	140	11,200	C
6850	2,000	15	30,000	B
3010	400	20	8,000	C
4400	7,000	5	35,000	B

In descending order:

Item	Usage x Cost	Category
4021	$70,000	A
4400	35,000	B
6850	30,000	
4066	28,000	
4050	11,200	C
9280	10,200	
3010	8,000	
9402	3,600	
6500	3,000	

5. D = 750 pots/mo. x 12 mo./yr. = 9,000 pots/yr.

Price = $2/pot   S = $20   P = $50   H = ($2)(.30) = $.60/unit/year

a. $Q_o = \sqrt{\dfrac{2DS}{H}} = \sqrt{\dfrac{2(9{,}000)20}{.60}} = 774.60 \approx 775$

$TC = \dfrac{774.6}{2}(.60) + \dfrac{9{,}000}{774.6}(20)$

TC = 232.35 + 232.36

= 464.71

If Q = 1500

$TC = \dfrac{1{,}500}{2}(.6) + \dfrac{9{,}000}{1{,}500}(20)$

TC = 450 + 120 = $570

Therefore the additional cost of staying with the order size of 1,500 is:

$570 – $464.71 = $105.29

b. Only about one half of the storage space would be needed.

9. p = 5,000 hotdogs/day $\Big\}$

u = 250 hotdogs/day
300 days per year
S = $22
H = $.15/hotdog per yr.

D= 250/day x 300 days/yr. = 75,000 hotdogs/yr.

a. $Q_o = \sqrt{\frac{2DS}{H}}\sqrt{\frac{p}{p\text{-}u}} = \sqrt{\frac{2(75{,}000)22}{.15}}\sqrt{\frac{5{,}000}{4{,}750}} = 4{,}812.27$ [round to 4,812]

b. D/Q_o = 75,000/4,812 = 15.59, or about 16 runs/yr.

c. run length: Q_o/p = 4,812/5,000 = .96 days, or approximately 1 day

18. expected demand during LT = 300 units
σ_{dLT} = 30 units
a. Z = 2.33, ROP = exp. demand + $Z\sigma_{d\ LT}$
300 + 2.33 (30) = 369.9 → 370 units
b. 70 units (from a.)
c. smaller Z → less ss
ROP smaller:

19. LT demand = 600 lb.
$\sigma_{d\ LT}$ = 52 lb.
risk = 4% → Z = 1.75
a. ss = $Z\sigma_{d\ LT}$ = 1.75 (52 lbs.) = 91 lbs.
b. ROP = Average demand during lead time + safety stock
ROP = 600 + 91 = 691 lbs.

27. D $= 10$ rolls/day x 360 days/yr. = 3,600 rolls/yr.

$\bar{d} = 10$ rolls/day LT $= 3$ days H = \$.40/roll per yr.

$\sigma_d = 2$ rolls/day S $= \$1$

a. $Q_0 = \sqrt{\dfrac{2DS}{H}} = \sqrt{\dfrac{2(3{,}600)1}{.40}} = 134.16$ [round to 134]

b. SL of 96 percent requires z = +1.75

$ROP = \bar{d}\,(LT) + z\sqrt{LT}(\sigma_d) = 10(3) + 1.75\sqrt{3}(2) = 36.06$ [round to 36]

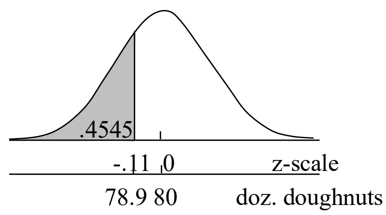
c. $E(n) = E(z)\,\sigma_{d\ LT} = .016(\sqrt{LT})(\sigma_d) = .016\sqrt{3}(2) = .0554$/cycle

$E(N) = E(n)\dfrac{D}{Q} = .0554\,\dfrac{3600}{134} = 1.488$ or about 1.5 rolls

d. $1 - SL_{annual} = E(z)\dfrac{\sigma_{dLT}}{Q} = (.016)\dfrac{3.464}{134.16} = .000413$

$SL_{annual} = 1 - .000413 = .9996$

32.



C_s = Rev - Cost = \$4.80 - \$3.20 = \$1.60

C_e = Cost - Salvage = \$3.20 - \$2.40 = \$.80

$$SL = \frac{C_s}{C_s + C_e} = \frac{\$1.60}{\$1.60 + \$.80} = \frac{1.6}{2.4} = .67$$

x Demand	P(x)	Cum. P(x)
19	.01	.01
20	.05	.06
21	.12	.18
22	.18	.36
23	.13	.49
24	.14	.63
25	.10	.73
26	.11	.84
27	.10	.94
.	.	.
.	.	.
.	.	.

Since this falls between the cumulative probabilities of .63(x = 24) and .73(x = 25), this means Don should stock 25 dozen doughnuts.

35. $C_s = \$88,000$

$C_e = \$100 + 1.45(\$100) = \$245$

a. $$SL = \frac{C_s}{C_s + C_e} = \frac{\$88,000}{\$88,000 + \$245} = .9972$$

Using the Poisson probabilities, the minimum level stocking level that will provide the desired service is nine spares (cumulative probability = .998).

[From Poisson Table with $\mu = 3.2$]

x	Cum. Prob.
0	.041
1	.171
2	.380
3	.603
4	.781
5	.895
6	.955
7	.983
8	.994
9	.998
.	.
.	.
.	.

Solutions (continued)

b. $$SL = \frac{C_s}{C_s + C_e}$$

$$.041 = \frac{C_s}{C_s + 245}$$

$$.041(C_s + 245) = C_s$$

$$.041C_s + 10.045 = C_s$$

$$.959C_s = 10.045$$

$$C_s = \$10.47$$

Carrying no spare parts is the best strategy if the shortage cost is less than or equal to \$10.47 ($C_s \le 10.47$).