

Chapter 11, Estimation of Absolute Performance
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Exercise Question No. 10:
A store selling Mother's Day cards must decide 6 months in advance on the number of cards to stock. Reordering is not allowed. Cards cost \$0.45 and sell for \$1.25. Any cards not sold by Mother's Day go on sale for \$0.50 for 2 weeks. However, sales of the remaining cards is probabilistic in nature according to the following distribution:
32% of the time, all cards remaining get sold.
40% of the time, 80% of all cards remaining are sold.
28% of the time, 60% of all cards remaining are sold.
Any cards left after 2 weeks are sold for \$0.25. The card-shop owner is not sure how many cards can be sold, but thinks it is somewhere (i.e., uniformly distributed) between 200 and 400. Suppose that the card-shop owner decides to order 300 cards. Estimate the expected total profit with an error of at most \$5.00. [Hint: Make ten initial replications. Use these data to estimate the total sample size needed. Each replication consists of one Mother's Day.]
Solution:
Calculate the Average Profit = [Sum of all profit]/[Total number of replications]
 $E =$ Check for Error of \pm \$5.00.
 s =Standard deviation of profit.
Determine required sample size (n):

$$n = \left(z \cdot \frac{s}{E} \right)^2$$

z : confidence level (e.g., 1.96 for 95% confidence).
 s : standard deviation of the profits.
 E : desired margin of error (\$5.00).

Calculate the Average Profit	=	160	<input type="text"/>
Check for Error of +- \$5.00, standard deviation of Profit	=	69	Check for Error of \pm \$5.00, standard deviation s
Required Sample Size (n)	=	742	<= --Number of simulations required to achieve the desired accuracy.

Week 2										
Replication	Random #	Demand range (200 to 400) fixed	Demand (D)	Sold at \$1.25	Unsold Cards	Sold at \$0.50	Leftover Cards	Revenue (\$)	Cost(\$)	Profit(\$)
1	0.364	400	146	146	154	124	31	251	135	116
2	0.610	400	244	244	56	45	11	330	135	195
3	0.441	400	176	176	124	99	25	276	135	141
4	0.788	400	315	300	0	0	0	375	135	240
5	0.028	400	11	11	289	289	0	159	135	24
6	0.648	400	259	259	41	33	8	342	135	207
7	0.920	400	368	300	0	0	0	375	135	240
8	0.656	400	263	263	37	30	7	345	135	210
9	0.475	400	190	190	110	88	22	287	135	152
10	0.972	400	389	300	0	0	0	375	135	240
11	0.165	400	66	66	234	234	0	199	135	64
12	0.227	400	91	91	209	209	0	218	135	83
13	0.832	400	333	300	0	0	0	375	135	240
14	0.158	400	63	63	237	237	0	197	135	62
15	0.861	400	345	300	0	0	0	375	135	240
16	0.460	400	184	184	116	93	23	282	135	147
17	0.440	400	176	176	124	99	25	276	135	141
18	0.522	400	209	209	91	73	18	302	135	167
19	0.656	400	262	262	38	30	8	345	135	210
20	0.956	400	383	300	0	0	0	375	135	240
21	0.240	400	96	96	204	204	0	222	135	87
22	0.187	400	75	75	225	225	0	206	135	71