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):

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

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	=	223	
Check for Error of +- $5.00, standard deviation of Profit	=	23	Check for Error of $\pm\$5.00$, standard deviation s
Required Sample Size (n)	=	85	$<-- Number\ of\ simulations\ required\ to\ achieve\ the\ desired\ accuracy.$

Week 2

Replication	Random #		Demand (D)	Sold at $1.25	Unsold Cards	Sold at $0.50	Leftover Cards	Revenue ($)	Cost($)	Profit($)
1	0.926		385	300	0	0	0	375	135	240
2	0.820		364	300	0	0	0	375	135	240
3	0.541		308	300	0	0	0	375	135	240
4	0.726		345	300	0	0	0	375	135	240
5	0.852		370	300	0	0	0	375	135	240
6	0.114		223	223	77	77	0	317	135	182
7	0.368		274	274	26	21	5	354	135	219
8	0.412		282	282	18	14	4	361	135	226
9	0.557		311	300	0	0	0	375	135	240
10	0.481		296	296	4	3	1	372	135	237
11	0.092		218	218	82	82	0	314	135	179
12	0.711		342	300	0	0	0	375	135	240
13	0.113		223	223	77	77	0	317	135	182
14	0.855		371	300	0	0	0	375	135	240
15	0.963		393	300	0	0	0	375	135	240
16	0.721		344	300	0	0	0	375	135	240
17	0.099		220	220	80	80	0	315	135	180
18	0.270		254	254	46	46	0	341	135	206
19	0.186		237	237	63	63	0	328	135	193
20	0.829		366	300	0	0	0	375	135	240
21	0.751		350	300	0	0	0	375	135	240
22	0.447		289	289	11	8	2	367	135	232