

Testing for Goodness of Fit

Check Out Times (minutes)

2.50	1.50	0.50	11.00	0.50
1.54	2.00	19.50	11.50	17.50
0.50	3.00	1.00	2.00	3.50
10.00	4.50	6.00	1.50	5.00
1.50	8.50	14.50	1.00	0.50

Source: Lapin and Whisler, Quantitative Decision Making, section 17-10.

1

Computing Test Statistic D

Position	Time	Actual Frequency	Expected Frequency	Deviation
1	0.5	0.04	0.09516	-0.05516
2	0.5	0.08	0.09516	-0.01516
3	0.5	0.12	0.09516	0.02484
4	0.5	0.16	0.09516	0.06484
5	1	0.2	0.18127	0.01873
24	17.5	0.96	0.96980	-0.00980
25	19.5	1	0.97976	0.02024
			Max -->	0.15032
average	5.24			
1/average	0.19084			

Mean rate, μ , = 0.20 customers per minute

Actual frequency = position / n (relative frequency)

Expected frequency = $1 - e^{-\mu \cdot t}$

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Source: Lapin and Whisler, Quantitative Decision Making, section 17-10.

Kolmogorov-Smirnov Test Statistic

$$D = \max | F_{\alpha}(t) - F_e(t) |$$

Null hypothesis = exponential distribution applies
 Alternate hypothesis = exponential does not apply

If computed value of D is greater than table value
 then reject the null and accept the alternate.
 Otherwise, FTR null and conclude distribution
 applies.

For $n = 25$ and $\alpha = 0.05$, table value is .23768,
 therefore, since our computed value (.15032) is
 less, we FTR null and accept exponential
 distribution.

3

Source: Lapin and Whisler, Quantitative Decision Making, section 17-10.

TABLE G Critical Values of D for Kolmogorov-Smirnov Goodness-of-Fit Test

The following table provides the critical values D_{α} corresponding to an upper tail probability α of the test statistic D. The following relationship holds

$$\alpha = \Pr[D \geq D_{\alpha}]$$

n	$\alpha = .10$	$\alpha = .05$	$\alpha = .025$	$\alpha = .01$	$\alpha = .005$
1	.90000	.95000	.97500	.99000	.99500
2	.68377	.77639	.84189	.90000	.92929
3	.56481	.63604	.70760	.78456	.82900
4	.49265	.56522	.62394	.68887	.73424
5	.44698	.50945	.56328	.62718	.66853
6	.41037	.46799	.51926	.57741	.61661
7	.38148	.43607	.48342	.53844	.57581
8	.35831	.40962	.45427	.50654	.54179
9	.33910	.38746	.43001	.47960	.51332
10	.32260	.36866	.40925	.45662	.48893
11	.30829	.35242	.39122	.43670	.46770
12	.29577	.33815	.37543	.41918	.44905
13	.28470	.32549	.36143	.40362	.43247
14	.27481	.31417	.34890	.38970	.41762
15	.26588	.30397	.33760	.37713	.40420
16	.25778	.29472	.32733	.36571	.39201
17	.25039	.28627	.31796	.35528	.38086
18	.24360	.27851	.30936	.34569	.37062
19	.23735	.27136	.30143	.33685	.36117
20	.23156	.26473	.29408	.32866	.35241

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Source: Lapin and Whisler, Quantitative Decision Making 7ed, Table G.

TABLE G Critical Values of D for Kilmogorov-Smirnov Goodness-of-Fit Test

The following table provides the critical values Q , corresponding to an upper tail probability α of the test statistic D . The following relationship holds

$$\alpha = \Pr\{D \geq D_\alpha\}$$

n	$\alpha = .10$	$\alpha = .05$	$\alpha = .025$	$\alpha = .01$	$\alpha = .005$
21	.22617	.25858	.28724	.32104	.34427
22	.22115	.25283	.28087	.31394	.33666
23	.21645	.24746	.27490	.30728	.32954
24	.21205	.24242	.26931	.30104	.32286
25	.20790	.23768	.26404	.29516	.31657
26	.20399	.23320	.25907	.28962	.31064
27	.20030	.22898	.25438	.28438	.30502
28	.19680	.22497	.24993	.27942	.29971
29	.19348	.22117	.24571	.27471	.29466
30	.19032	.21756	.24170	.27023	.28987
31	.18732	.21412	.23788	.26596	.28530
32	.18445	.21085	.23424	.26189	.28094
33	.18171	.20771	.23076	.25801	.27677
34	.17909	.20472	.22743	.25429	.27279
35	.17659	.20185	.22425	.25073	.26897
36	.17418	.19910	.22119	.24732	.26532
37	.17188	.19646	.21826	.24404	.26180
38	.16966	.19392	.21544	.24089	.25843
39	.16753	.19148	.21273	.23786	.25518
40	.16547	.18913	.21012	.23494	.25205

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Source: Lapin and Whisler, *Quantitative Decision Making*, 7ed, Table G.**TABLE G** Critical Values of D for Kilmogorov-Smirnov Goodness-of-Fit Test

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41	.16349	.18687	.20760	.23213	.24904
42	.16158	.18468	.20517	.22941	.24613
43	.15974	.18257	.20283	.22679	.24332
44	.15796	.18053	.20056	.22426	.24060
45	.15623	.17856	.19837	.22181	.23798
46	.15457	.17665	.19625	.21944	.23544
47	.15295	.17481	.19420	.21715	.23298
48	.15139	.17302	.19221	.21493	.23059
49	.14987	.17128	.19028	.21277	.22828
50	.14840	.16959	.18841	.21068	.22604

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Source: Lapin and Whisler, *Quantitative Decision Making*, 7ed, Table G.