

Egyfajta chip élettartamát vizsgálják szélsőséges körülmények között. 40 vizsgálatot végeztek, a  $\xi$  v.v. értéke az élettartam órában. Az eloszlás normálisnak tekinthető. Adjunk a chip élettartama szórására konfidencia intervallumot 95%-os biztonsági szinten.

Mit mondhatunk 90%-os szinten?

minta	$(x_i - \bar{x})^2$	mintanagyság n
110.59	117.41	40
158.41	1367.70	
biztonsági szint, c		0.95
mintaátlag, $\bar{x}$		124.1226
tápasztali szórás $S_n$		22.111
98.96	504.86	40
115.40	36.31	
149.90	810.69	40
116.95	20.07	
$k_1 = F_{n-1}^{-1}((1-c)/2)$		28.8595
$k_2 = F_{n-1}^{-1}((1+c)/2)$		68.1201
117.53	15.17	40
101.23	407.78	
121.58	13.58	40
102.30	0.00	
121.14	0.08	40
103.60	317.79	
100.20	450.42	40
130.59	83.96	
86.37	1229.28	40
139.84	339.95	
103.42	324.30	40
84.10	1393.23	
122.43	161.07	40
106.11	234.54	
128.14	45.05	40
140.46	362.35	
96.38	629.96	40
127.33	34.83	
95.37	679.13	40
125.89	19.92	
125.81	19.17	40
133.51	145.96	
162.30	1670.84	40
159.19	1426.22	
98.19	540.02	40
124.41	80.64	
149.86	780.16	40
113.43	63.89	
137.34	253.24	40
87.88	1125.65	
158.82	1398.19	40
115.87	10.97	
103.80	310.76	40
137.02	243.04	

$$\sqrt{n} \frac{S_n}{\sqrt{k_2}}, \sqrt{n} \frac{S_n}{\sqrt{k_1}}$$

A konfidencia intervallum 95%-os szinten [18,34;28,75] a szórásra.

$$k_1 = F_{n-1}^{-1}((1-c)/2)$$
$$k_2 = F_{n-1}^{-1}((1+c)/2)$$

Az esetek 90%-ban a szórás a szűkebb intervallumba esik

Adjunk 95%-os szintű bootstrap konfidencia intervallumot m-re, a szimulációk száma legyen N=100.

114.6841	79.4443	142.5996	149.5848	121.5404	91.4517	102.4169	128.4089	124.4456	102.8923	101.1314	109.4013	148.7380	122.2104
117.5833	139.3919	158.8283	134.7001	98.2140	127.3060	139.3864	147.0817	102.8634	118.0803	103.5063	109.6067	167.6053	
152.0555	118.4443	160.7630	142.9628	110.5293	99.0796	129.0862	161.8014	153.1259	109.6699	135.1628	109.4699	134.6272	83.7655
94.2344	14.7176	104.3862	119.4633	115.4429	135.4077	100.0626	109.2697	138.5523	149.1786	140.0678	143.9415	116.1523	103.0886
110.3438	131.2319	172.8253	119.7949	87.4433	130.3530	121.6808	112.7300	111.0515	117.5077	155.1433	129.7198	93.3035	130.2668
149.3918	114.6458	105.9533	130.1606	96.9630	150.7377	113.0471	174.6372	144.8584	110.1418	110.0384	113.9687	118.0786	126.1828
155.5214	120.8694	83.3733	117.8834	125.8841	98.1846	82.0499	112.4717	115.9848	111.7229	119.2754	106.9629	114.4114	110.9608
91.2427	119.0455	155.8634	130.4577	129.9143	110.6418	131.1052	109.4620	129.9933	125.1644	126.5001	121.9687	157.0567	86.5685
120.2306	111.4633	98.8870	101.9725	96.4019	145.7493	117.2066	130.7693	80.7074	128.6672	112.3082	115.2057	98.6238	108.4401
147.1975	131.7082	103.1615	97.1079	133.2311	129.4356	159.4659	160.2470	173.3536	127.3498	131.3309	98.2697	158.5692	125.2159
123.9308	140.5722	128.6351	131.3085	123.5505	113.2177	154.9873	138.5226	153.8051	128.1392	91.9692	132.3248	116.4391	131.2899
102.0297	110.1283	142.2071	121.4998	136.3545	133.0897	132.9577	142.0773	125.4754	177.6821	131.3640	69.9430	153.7854	136.7303
136.4361	141.0867	114.6522	90.4045	134.6050	107.1435	146.2224	124.0721	171.4460	87.3992	143.9353	116.1924	129.2390	136.4353
116.8304	105.4590	118.6577	126.3197	150.2165	83.0737	97.5214	116.9824	166.2564	126.0255	136.7176	110.1900	150.0985	127.9170
166.5431	103.1625	115.8054	135.7232	141.6661	95.5690	122.8833	142.5836	140.2616	119.7152	134.5646	156.5698	127.0802	
152.7504	134.7832	134.5707	107.7139	104.0058	126.5847	117.7806	127.0365	132.6180	95.6726	137.7618	112.6880	126.8951	138.5454
104.0319	113.3661	106.5888	105.0256	109.7489	129.4544	135.8887	96.4179	98.3748	115.9119	132.3783	105.6690	102.1284	112.0312
119.0170	114.5323	114.8532	116.0513	103.5850	133.4475	145.1096	129.7507	135.9470	122.6065	85.2604	100.3625	110.6933	
73.3601	111.9088	141.7899	121.5607	92.5981	132.3668	117.6004	102.8659	134.0276	136.7155	104.4794	126.3908	95.4446	112.0422
110.5980	145.5183	116.7025	145.0162	126.8045	125.9736	112.0052	120.9517	128.8567	137.9513	100.9139	105.2431	125.7751	
113.7320	126.5922	96.9743	107.9448	135.5340	133.5785	100.4691	132.6603	140.1621	134.6151	148.5899	90.4055	119.8492	132.0779
108.3298	111.8809	99.5853	112.4717	106.3677	112.1254	141.4064	98.2614	109.6320	125.8708	135.1464	101.7045	97.3660	
159.3036	126.2243	97.2868	115.9811	86.0053	103.7718	112.2212	126.9838	93.2045	136.8533	166.8694	110.4241	94.8586	119.1887
153.1618	107.9631	119.5183	142.1204	120.0103	100.6549	97.4428	122.9368	124.2511	109.0313	92.4590	141.2531	97.5884	119.3009
107.0579	124.9541	142.2755	150.0476	113.3554	115.8135	107.6727	133.1909	150.2402	102.2375	106.2566	139.0265	100.5646	106.9861
104.4375	186.0376	138.6884	136.8966	128.4444	105.3578	138.9269	119.8763	79.2269	91.4390	121.7146	128.6833	97.3786	118.1522
129.3985	140.6550	114.2921	142.3152	118.1054	136.1385	113.4169	122.6913	121.7677	107.6256	125.1147	97.0866	127.1029	
144.3614	152.3610	104.3862	141.9537	119.4368	138.3521	146.7824	148.9753	98.2169	106.1357	121.2917	105.3760	130.7213	136.4354
122.0699	132.4434	106.2009	128.4089	150.0164	133.4548	105.8126	133.2143	100.8490	130.6493	113.9119	145.9297	70.2926	132.5834
165.3254	104.0853	149.1229	113.8792	142.1781	140.9515	109.6554	115.9307	120.6628	141.7150	99.3039	137.1415	71.1683	
117.7960	83.2753	112.0774	115.4693	81.8501	107.0683	144.5610	131.1331	139.5540	87.5804	134.2451	132.7972	117.0221	109.9932
140.6091	102.1036	140.6091	116.0513	103.5850	133.4475	145.1096	129.7507	135.9470	122.6065	85.2604	100.3625	110.6933	
107.0683	144.3674	91.3880	126.6800	96.5199	125.2880	126.8650	121.4558	140.0413	119.3077	122.9354	148.1091	138.0689	109.9932
95.7192	167.8019	92.5148	145.7989	100.3319	143.4389	109.5754	113.3426	150.3712	122.3695	88.9050	138.3157	118.2035	156.4288
105.6166	147.2057	127.8281	130.4154	126.6048	127.9252	118.9795	133.2662	88.9589	159.8581	146.0929	132.6103	105.8690	167.2373
122.3213	144.9655	96.9494	116.2428	115.1158	102.6922	127.8181	97.0490	140.6590	127.0524	120.7977	124.6165	88.1740	119.2125
98.5812	109.2007	142.5916	126.4541	151.3333	140.3127	94.8728	127.7597	92.4191	126.9365	159.2396	119.2074	99.8893	126.4324
122.4525	135.1777	130.4687	127.3638	139.7154	176.9218	96.7601	151.4576	125.1078	114.5482	116.9449	126.6583	125.9455	107.0511
110.0294	108.2511	125.6596	137.1481	158.8992	126.8150	91.8455	127.1869	142.7499	91.6288	106.2287	133.3592	149.2718	66.6152
128.0290	93.7687	148.6764	126.5527	133.3295	123.9052	89.5459	99.5839	125.5989	131.4489	121.6216	132.3929	138.7861	94.9343
116.3336	131.4131	105.3036	131.4131	143.3005	105.3036	155.8144	124.2016	151.8511	89.9097	113.1760			
95.1933	121.5099	130.8225	126.9475	145.6773	147.7519	155.0033	140.0581	108.0343	167.3013	69.2848	114.4381	131.8158	137.9916
105.2601	127.0977	114.2547	121.5844	167.4471	147.7396	159.4374	122.7726	115.3868	137.3798	100.1955	123.8031	134.2411	126.9484
102.3851	123.1898	124.1488	136.1047	149.7415	104.4271	113.3481	141.6227	110.4328	138.6688	82.8659	139.1149	115.449	135.0633
136.8783	89.1131	143.8876	116.3227	113.4619	103.7229	99.1443	119.8102	127.4717	104.3626	17.801	80.077	112.1144	100.1608
116.1036	122.6269	164.7691	121.8938	122.6269	122.6269	122.6269	122.6269	122.6269	122.6269	122.6269	122.6269	122.6269	122.6269
130.0364	128.6208	155.1920	112.0829	123.6824	87.9148	123.6824	93.0433	126.8698	132.0962	135.0563	130.7398	89.2697	179.1073
133.3217	96.9400	113.4998	116.5691	135.8234	135.8237	135.8237	89.6116	141.0215	137.0784	182.1362	145.8161	129.6475	147.1630
117.3288	195.2849	166.9933	88.7797	141.8235	124.9861	129.7781	88.2054	122.7743	112.0070	127.1450	127.4340	141.7769	84.9277
115.5849	178.9273	105.2740	130.3328	136.3078	124.2684	147.2048	108.4988	128.7312	138.9692	132.1685	122.6217	137.6597	139.6509
139.0741	123.2899	167.0142	114.2315	125.3871	129.1850	127.0260	100.0051	141.0742	80.4653	140.9415	117.7246	113.0817	101.4997
106.5612	110.9646	113.3571	134.6394	81.0168	137.6420	115.7704	85.1569	142.1913	134.7670	126.4185	88.0371	131.4002	134.3825
104.8267	104.1433	135.9071	127.6150	112.5708	129.6056	104.8762	124.8765	103.9504	87.3438	108.2269	113.6511	118.1368	94.3897
129.2120	123.0931	145.4840	76.4233	83.7254	90.5763	110.4973	94.9559	101.0688	110.9988	98.2140	79.6174	118.2462	124.4764
125.6236	150.3513	186.5304	114.5007	137.4222	50.7170	101.5895	102.6193	156.9948	108.4265	89.3200	115.0983	98.3686	99.9999
129.6782	149.2047	113.2884	120.6739	127.3778	83.6622	144.9927	77.8044	107.2537	101.4285	119.0303	130.5897	129.4999	122.1267
119.9662	97.1883	122.6622	95.9374	148.7861	144.6214	91.0917	129.9453	144.9327	136.2719	115.3306	117.4750	97.4999	151.4511
117.3288	195.2849	166.9933	88.7797	141.8235	124.9861	129.7781	88.2054	122.7743	112.0070	127.1450	127.4340	141.7769	84.9277
115.5849	178.9273	105.2740	130.3328	136.3078	124.2684	147.2048	108.4988	128.7312	138.9692	132.1685	122.6217	137.6597	139.6509
139.0741	123.2899	167.0142	114.2315	125.3871	129.1850	127.0260	100.0051	141.0742	80.4653	140.9415	117.7246	113.0817	101.4997
106.5612	110.9646	113.3571	134.6394	81.0168	137.6420	115.7704	85.1569	142.1913	134.7670	126.4185	88.0371	131.4002	134.3825
104.8267	104.1433	135.9071	127.6150	112.5708	129.6056	104.8762	124.8765	103.9504	87.3438	108.2269	113.6511	118.1368	94.3897
129.2120	123.0931	145.4840	76.4233	83.7254	90.5763	110.4973	94.9559	101.0688	110.9988	98.2140	79.6174	118.2462	124.4764
125.6236	150.3513	186.5304	114.5007	137.4222	50.7170	101.5895	102.6193	156.9948	108.4265	89.3200	115.0983	98.3686	99.9999
129.6782	149.2047	113.2884	120.6739	127.3778	83.6622	144.9927	77.8044	107.2537	101.4285	119.0303	130.5897	129.4999	122.1267
119.9662	97.1883	122.6622	95.9374	148.7861	144.6214	91.0917	129.9453	144.9327	136.2719	115.3306	117.4750	97.4999	151.4511
117.3288	195.2849	166.9933	88.7797	141.8235	124.9861	129.7781	88.2054	122.7743	112.0070	127.1450	127.4340	141.7769	84.9277
115.5849	178.9273	105.2740	130.3328	136.3078	124.2684	147.2048	108.4988	128.7312	138.9692	132.1685	122.6217	137.6597	