Test Generátorov

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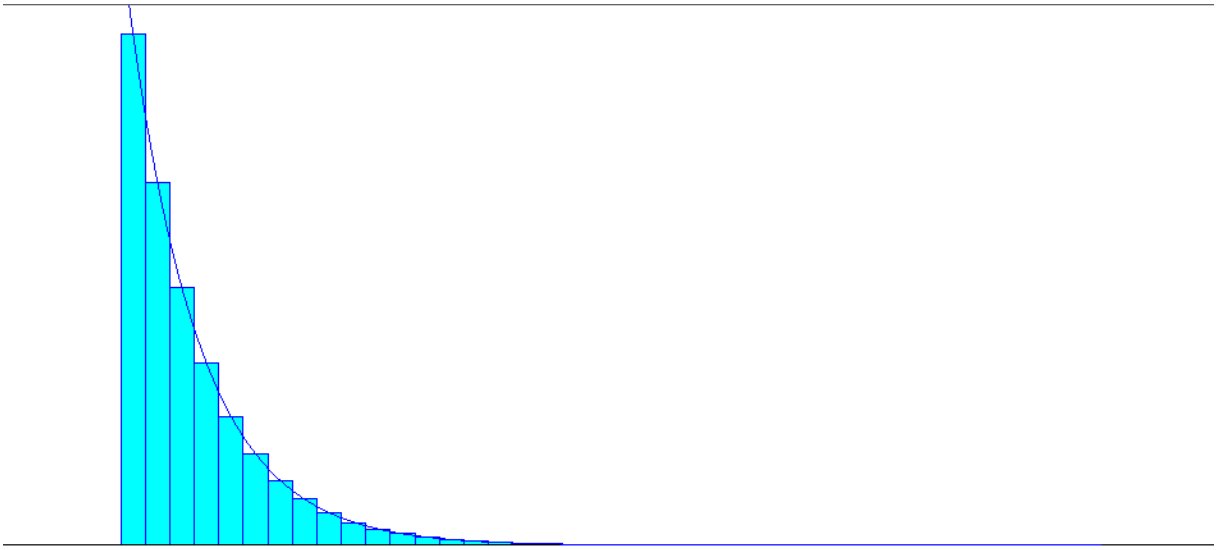
Generátor 1 - EXPO(300) – Príchod zákazníkov do systému

Prúd zákazníkov prichádzajúcich do autoservisu je poissonovsky prúd s intenzitou z = 12 zákazníkov za hodinu. Modelujem to exponenciálnym rozdelením 300 s. Každých 300 s vygeneruje nového zákazníka.
Exponenciálne rozdelenie - 300



Distribution Summary

Distribution: Exponential
Expression: EXPO(300)
Square Error: 0.000001

Chi Square Test
Number of intervals = 32
Degrees of freedom = 30
Test Statistic = 33
Corresponding p-value = 0.335

Data Summary

Number of Data Points = 1000000
Min Data Value = 0.000352
Max Data Value = 4.12e+003
Sample Mean = 300
Sample Std Dev = 299

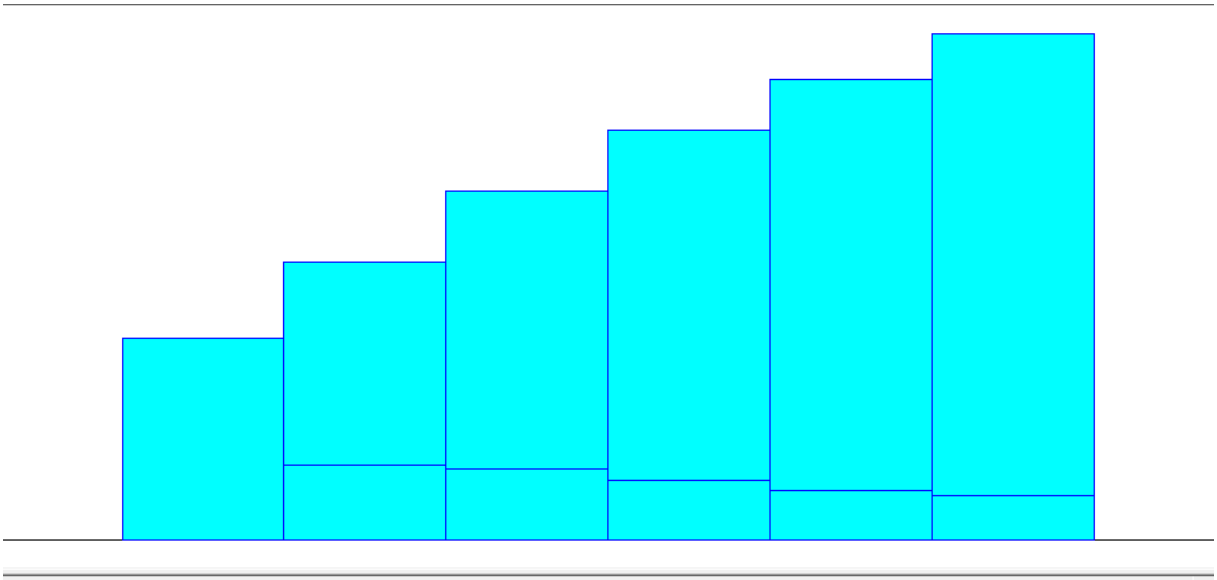
Histogram Summary

Histogram Range = 0 to 4.12e+003
Number of Intervals = 40

Generátor 2 - Empirical – Počet požadovaných opráv zákazníka

Pravdepodobnosti počtu opráv, ktoré bude zákazník požadovať
Empirické rozdelenie – 1 – 6

Počet opráv:	1	2	3	4	5	6
Pravdepodobnosť	0.4	0.15	0.14	0.12	0.1	0.09
Kumulatívne	0,4	0,55	0,69	0,81	0,91	1



Distribution Summary

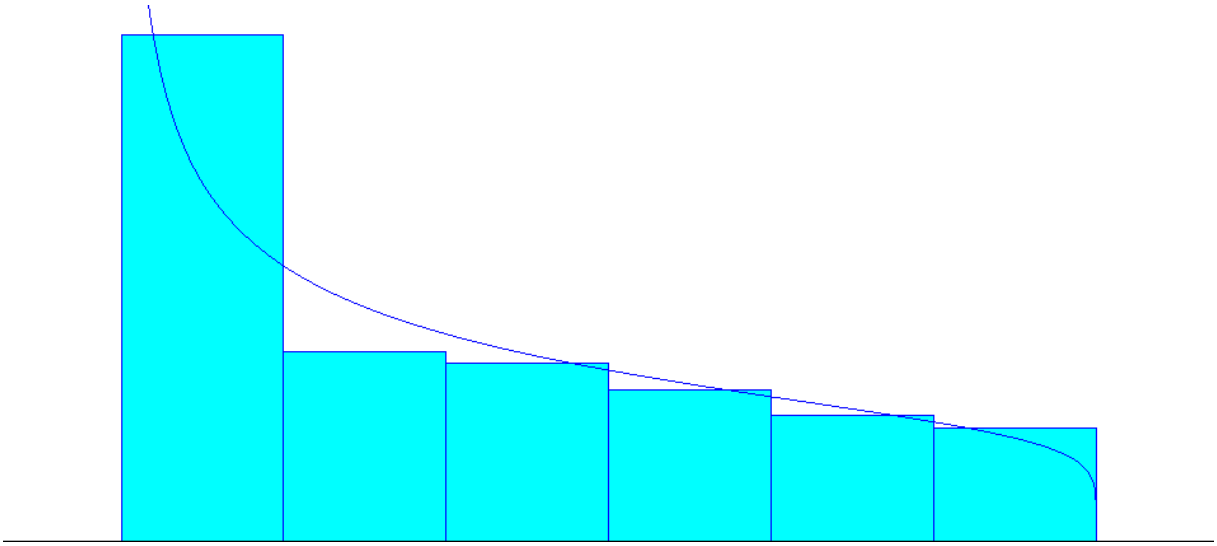
Distribution: Empirical
Expression: CONT or DISC (0.000, 0.500,
0.400, 1.500,
0.550, 2.500,
0.690, 3.500,
0.810, 4.500,
0.910, 5.500,
0.910, 6.500)

Data Summary

Number of Data Points = 1000000
Min Data Value = 1
Max Data Value = 6
Sample Mean = 2.64
Sample Std Dev = 1.72

Histogram Summary

Histogram Range = 0.5 to 6.5
Number of Intervals = 6



Distribution Summary

Distribution: Beta
Expression: 0.5 + 6 * BETA(0.643, 1.16)
Square Error: 0.002490

Chi Square Test
Number of intervals = 6
Degrees of freedom = 3
Test Statistic = 1.19e+004
Corresponding p-value < 0.005

Data Summary

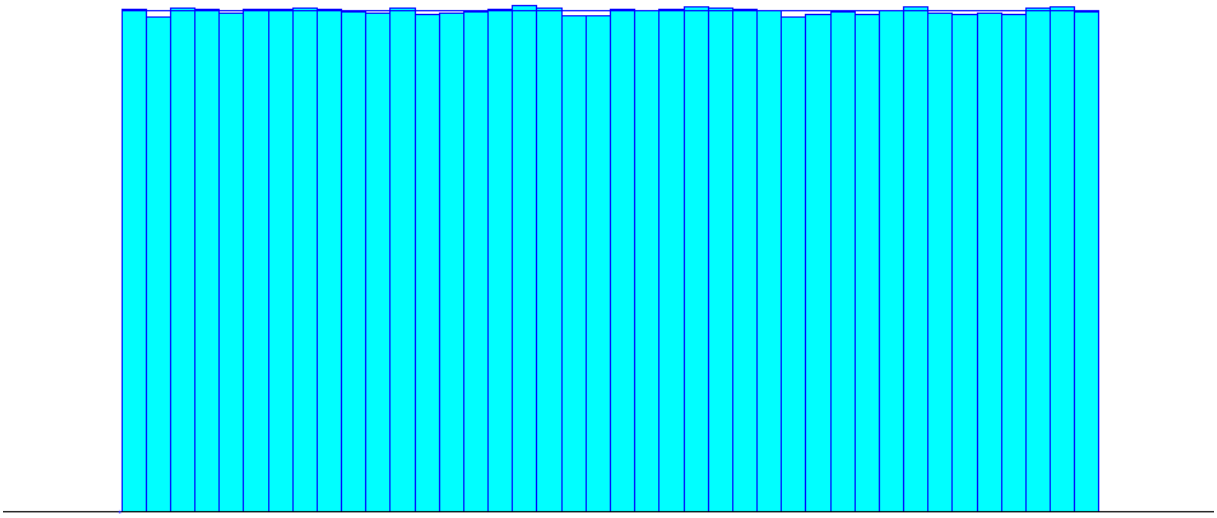
Number of Data Points = 1000000
Min Data Value = 1
Max Data Value = 6
Sample Mean = 2.64
Sample Std Dev = 1.72

Histogram Summary

Histogram Range = 0.5 to 6.5
Number of Intervals = 6

Generátor 3 - UNIF(70, 310) – Prevzatie objednávky od zákazníka

Čas potrebný na prevzatie objednávky od zákazníka o = 190 s +- 120 s .
Spojité rovnomerné rozdelenie – <70, 310>



Distribution Summary

Distribution: Uniform
Expression: UNIF(70, 310)
Square Error: 0.000001

Chi Square Test
Number of intervals = 40
Degrees of freedom = 39
Test Statistic = 38.7
Corresponding p-value = 0.486

Data Summary

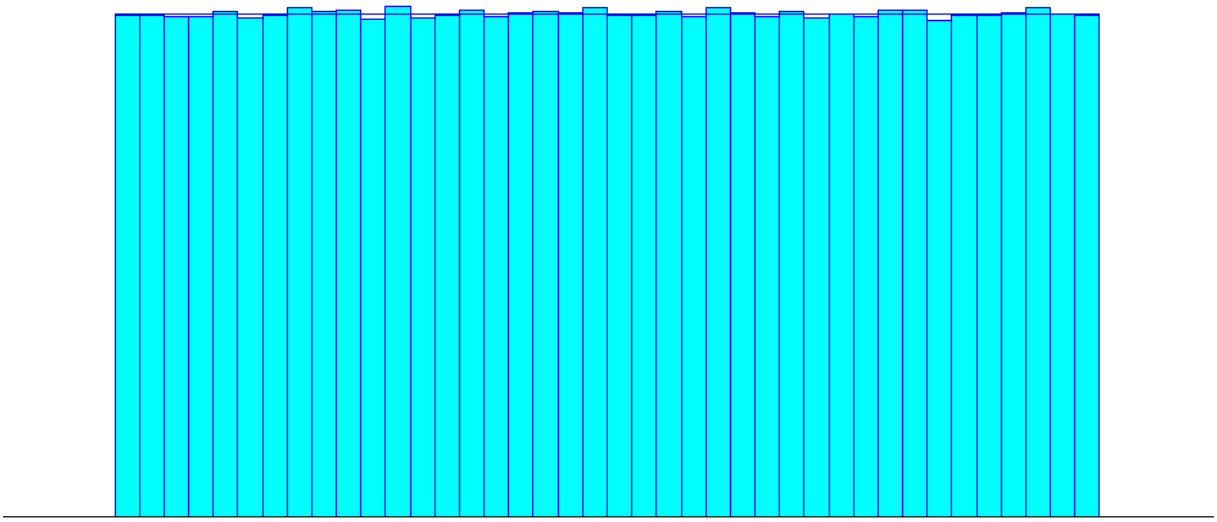
Number of Data Points = 1000000
Min Data Value = 70
Max Data Value = 310
Sample Mean = 190
Sample Std Dev = 69.3

Histogram Summary

Histogram Range = 70 to 310
Number of Intervals = 40

Generátor 4 – UNIF(80, 160) - Prevzatie auta od zákazníka

Čas potrebný na prevzatie auta od zákazníka p = 120s +- 40 s
Spojité rovnomerné rozdelenie – <80, 160>



Distribution Summary

Distribution: Uniform
Expression: UNIF(80, 160)
Square Error: 0.000001

Chi Square Test
Number of intervals = 40
Degrees of freedom = 39
Test Statistic = 45.3
Corresponding p-value = 0.231

Data Summary

Number of Data Points = 1000000
Min Data Value = 80
Max Data Value = 160
Sample Mean = 120
Sample Std Dev = 23.1

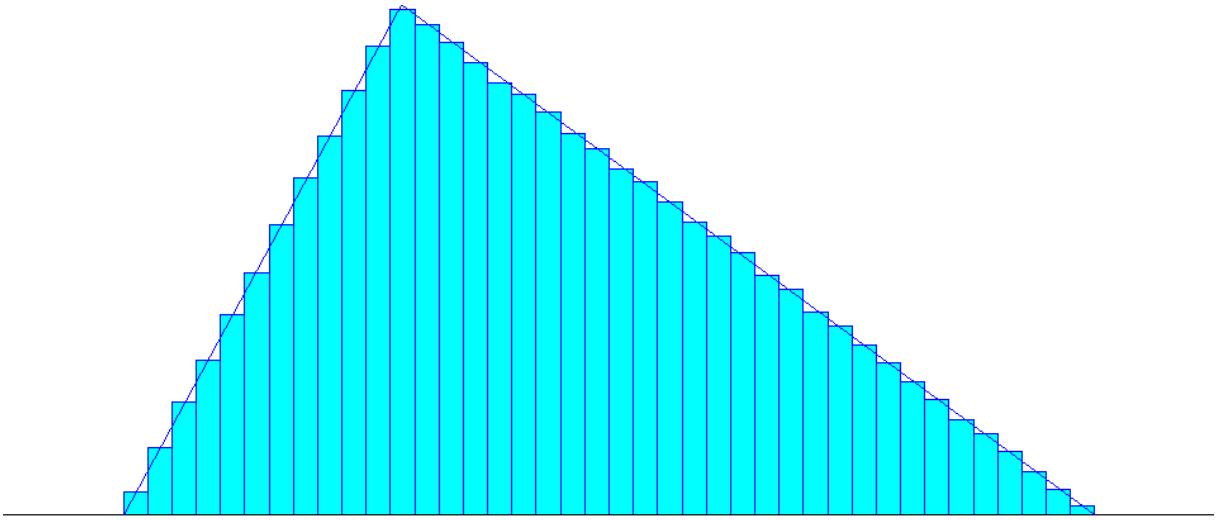
Histogram Summary

Histogram Range = 80 to 160
Number of Intervals = 40

Generátor 5 – TRIA(120, 240, 540) – Preparkovanie auta z parkoviska

Preparkovanie auta z parkoviska do dielne alebo naspäť sa riadi
Trojuholníkovým rozdelením s parametrami
min = 120 s, max 540, a modus = 240 s

Trojuholníkové rozdelenie – TRIA(120, 240, 540)



Distribution Summary

Distribution: Triangular
Expression: TRIA(120, 240, 540)
Square Error: 0.000001

Chi Square Test
Number of intervals = 40
Degrees of freedom = 38
Test Statistic = 52.9
Corresponding p-value = 0.0562

Data Summary

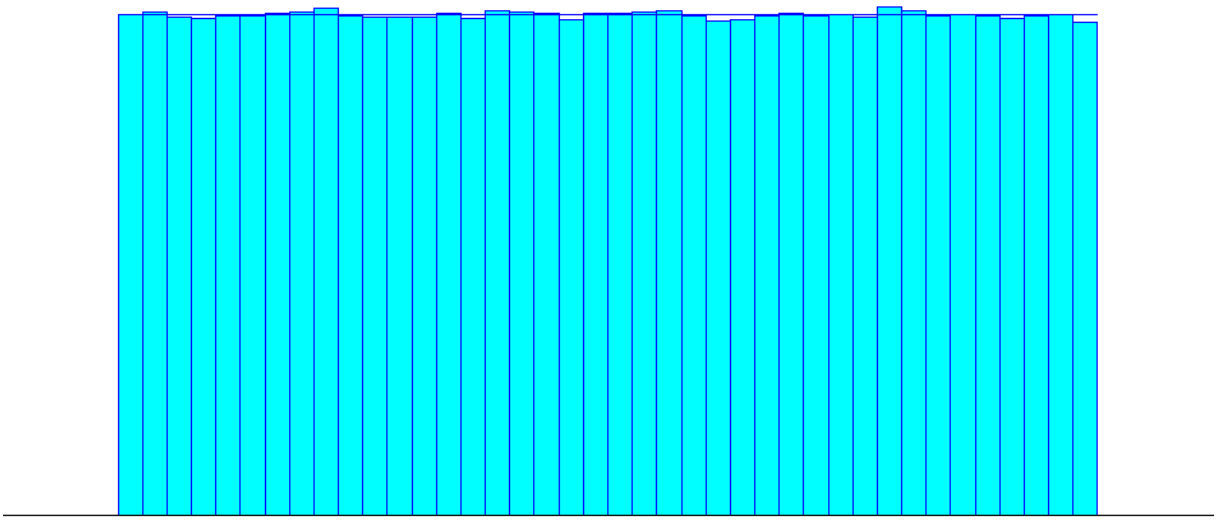
Number of Data Points = 1000000
Min Data Value = 120
Max Data Value = 540
Sample Mean = 300
Sample Std Dev = 88.3

Histogram Summary

Histogram Range = 120 to 540
Number of Intervals = 40

Generátor 6 – UNIF(123, 257) – Prevzatie opraveného auta

Prevzatie opraveného auta trvá s = 190 s +- 67s
Spojité rovnomerné rozdelenie – <123, 257>



Distribution Summary

Distribution: Uniform
Expression: UNIF(123, 257)
Square Error: 0.000001

Chi Square Test
Number of intervals = 40
Degrees of freedom = 39
Test Statistic = 38.2
Corresponding p-value = 0.508

Data Summary

Number of Data Points = 1000000
Min Data Value = 123
Max Data Value = 257
Sample Mean = 190
Sample Std Dev = 38.7

Histogram Summary

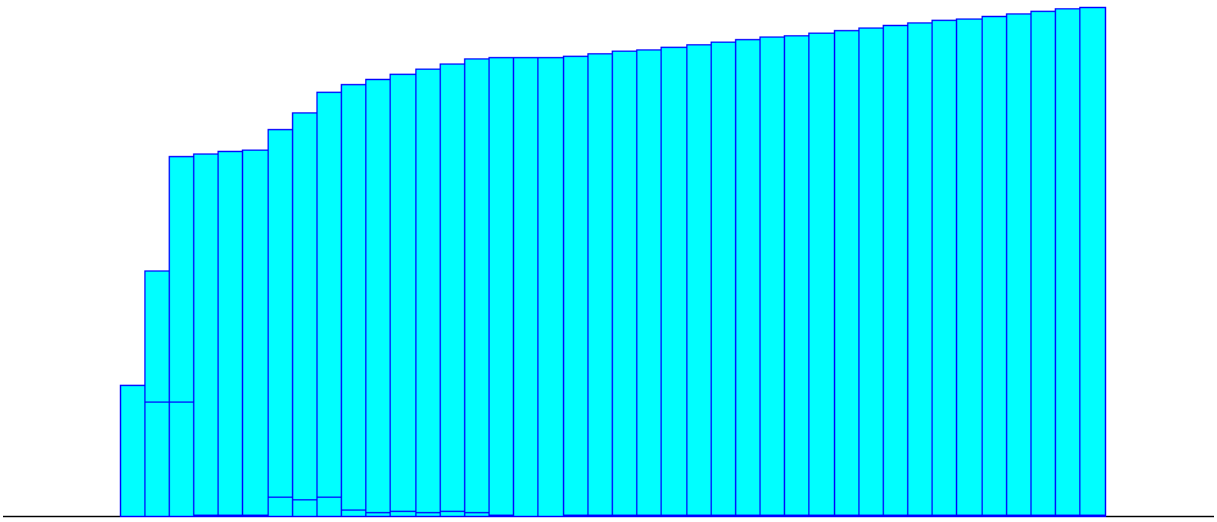
Histogram Range = 123 to 257
Number of Intervals = 40

Generátor 10 – Empirical - Trvanie opravy

Empirické rozdelenie

Pravdepodobnosti jednotlivých opráv a ich trvanie sú v tabuľke:

Typ opravy	Doba opravy		Pravdepodobnosť
	Typ rozdelenia	Čas v minútach	P
Jednoduchá	Diskrétne rovnomerné	Tmin = 2, Tmax = 20	p = 0.7
Stredne ťažká	Diskrétne empirické	Tmin = 10, Tmax = 40, p = 0.1 Tmin = 41, Tmax = 51, p = 0.6 Tmin =62, Tmax = 100, p = 0.3	p = 0.2
Zložitá	Diskrétne rovnomerné	Tmin = 120, Tmax = 260	p = 0.1



Distribution Summary

Distribution: Empirical

Expression: CONT or DISC (0.000, 1.999,

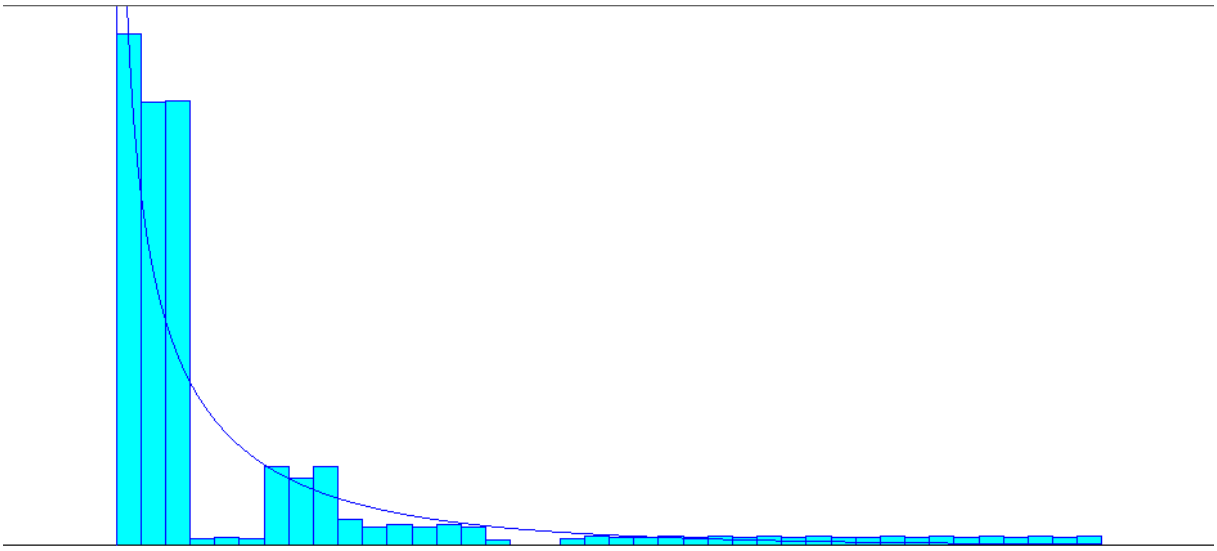
0.258, 8.449, 0.834, 60.049, 0.900, 111.650, 0.931, 163.250, 0.967, 214.851,
0.482, 14.899, 0.847, 66.499, 0.900, 118.100, 0.935, 169.700, 0.972, 221.301,
0.707, 21.349, 0.857, 72.950, 0.903, 124.550, 0.940, 176.150, 0.977, 227.751,
0.711, 27.799, 0.867, 79.400, 0.908, 131.000, 0.945, 182.600, 0.981, 234.201,
0.716, 34.249, 0.877, 85.850, 0.913, 137.450, 0.949, 189.050, 0.986, 240.651,
0.719, 40.699, 0.888, 92.300, 0.917, 143.900, 0.954, 195.501, 0.991, 247.101,
0.759, 47.149, 0.897, 98.750, 0.922, 150.350, 0.958, 201.951, 0.995, 253.551,
0.793, 53.599, 0.900, 105.200, 0.926, 156.800, 0.963, 208.401, 0.995, 260.001)

Data Summary

Number of Data Points = 1000000
Min Data Value = 2
Max Data Value = 260
Sample Mean = 38.2
Sample Std Dev = 56.2

Histogram Summary

Histogram Range = 2 to 260
Number of Intervals = 40



Distribution Summary

Distribution: Weibull
Expression: 2 + WEIB(27.2, 0.688)
Square Error: 0.036107

Chi Square Test
Number of intervals = 40
Degrees of freedom = 37
Test Statistic = 5.47e+005
Corresponding p-value < 0.005

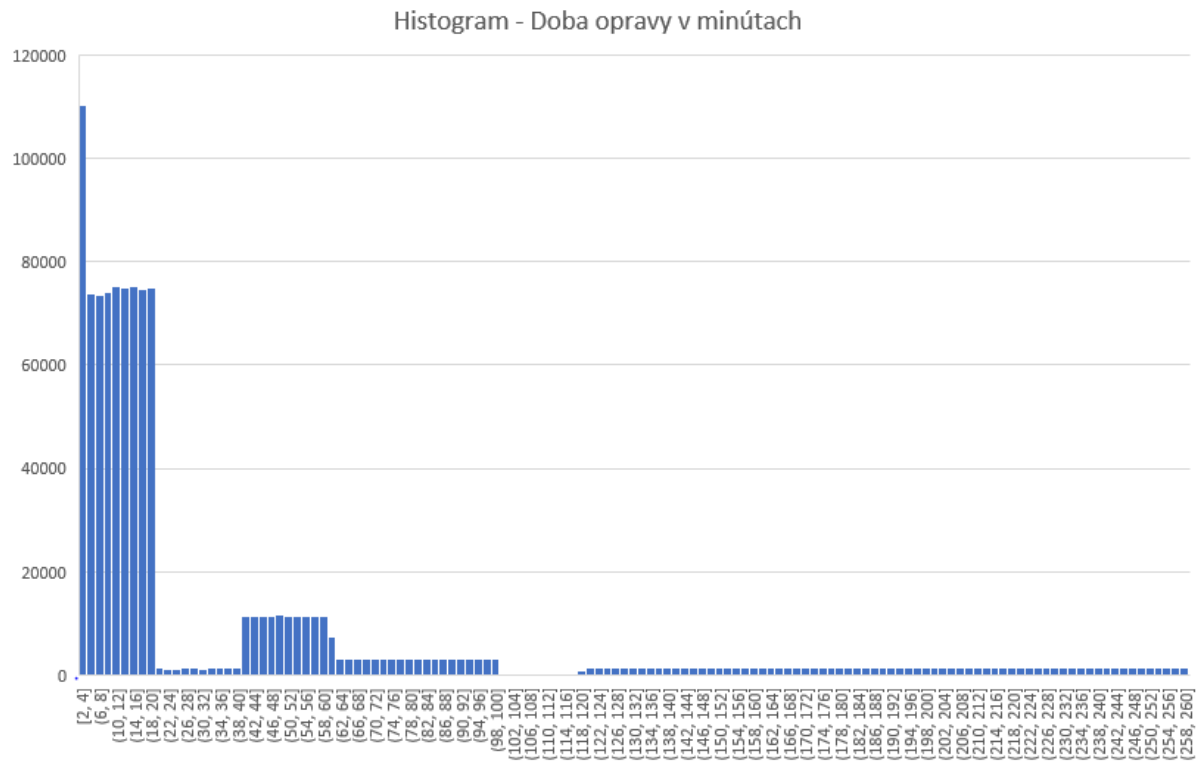
Data Summary

Number of Data Points = 1000000
Min Data Value = 2
Max Data Value = 260
Sample Mean = 38.2
Sample Std Dev = 56.2

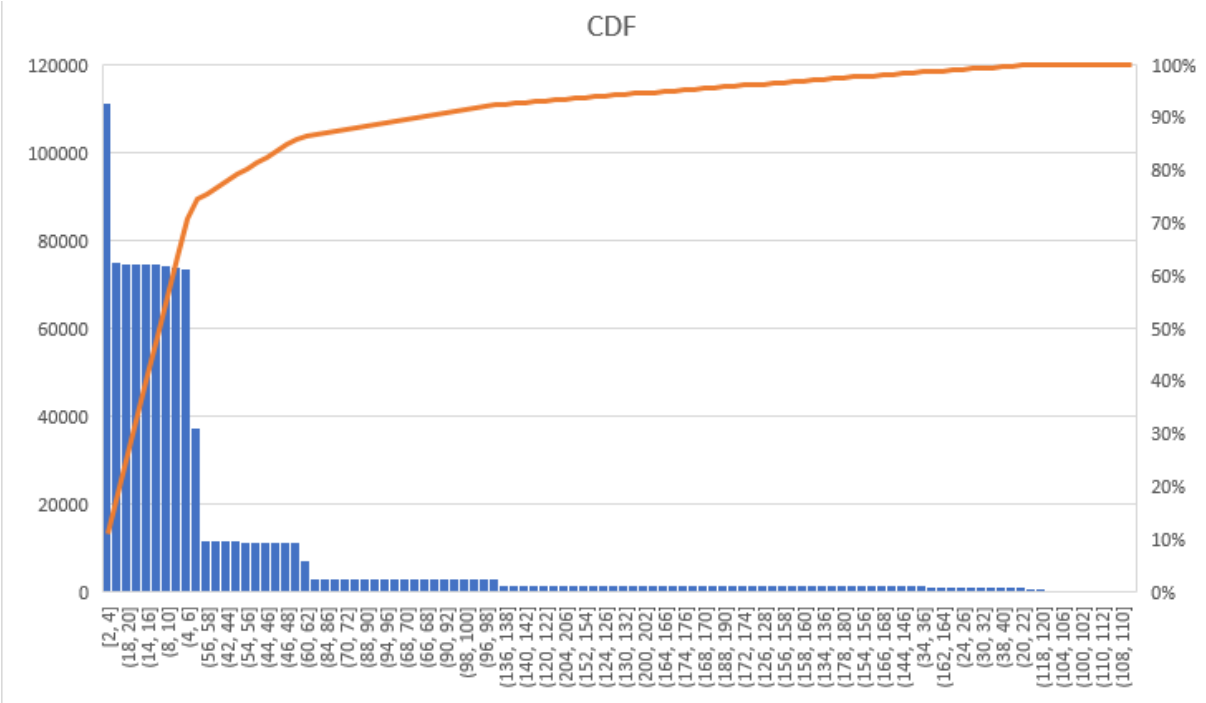
Histogram Summary

Histogram Range = 2 to 260
Number of Intervals = 40

Histogram – Doba opravy v minútach

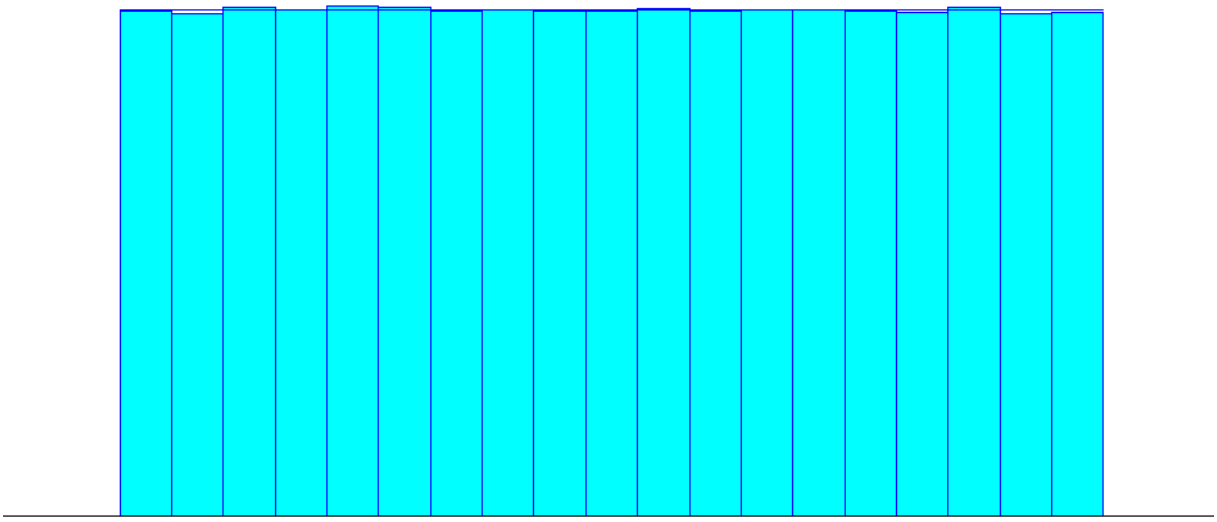


Histogram s kumulatívnou funkciou



Generátor 7 - UNIF(1.5, 20.5) – Pomocný generátor – Jednoduchá oprava

Jednoduchá oprava - trvanie v minútach
Diskrétne rovnomerne = Tmin = 2, Tmax = 20
Diskrétne rovnomerné rozdelenie – 2, 20



Distribution Summary

Distribution: Uniform
Expression: UNIF(1.5, 20.5)
Square Error: 0.000001

Chi Square Test
Number of intervals = 19
Degrees of freedom = 18
Test Statistic = 26.2
Corresponding p-value = 0.096

Data Summary

Number of Data Points = 1000000
Min Data Value = 2
Max Data Value = 20
Sample Mean = 11
Sample Std Dev = 5.48

Histogram Summary

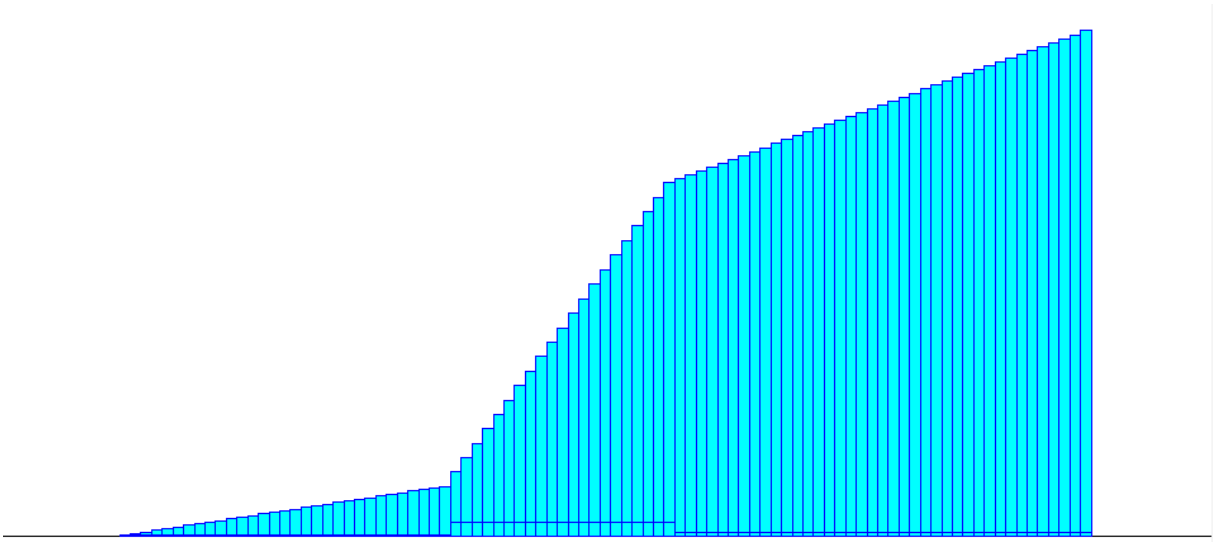
Histogram Range = 1.5 to 20.5
Number of Intervals = 19

Generátor 8 – Pomocný generátor – Stredne ťažká oprava

Diskrétne empirické rozdelenie

Stredne ťažká oprava - trvanie v sekundách

T:	10 - 40	41– 61	62 – 100
p:	0.1	0.6	0.3
k:	0,1	0,7	1



Distribution Summary

Distribution: Empirical

Expression: CONT or DISC (

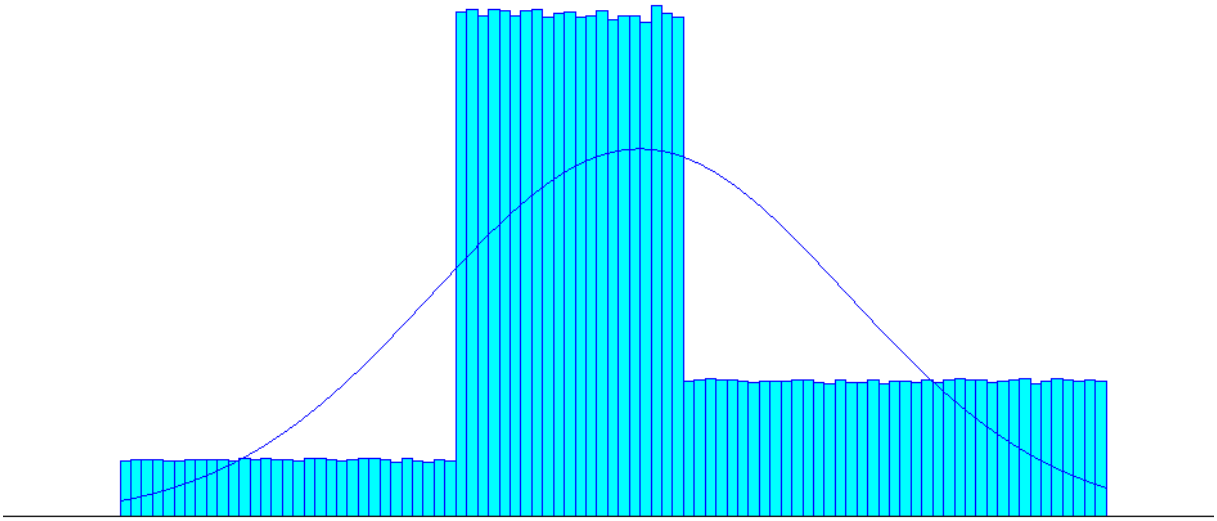
0.000, 9.500,	0.052, 25.500,	0.128, 41.500,	0.585, 57.500,	0.793, 73.500,	0.916, 89.500,
0.003, 10.500,	0.055, 26.500,	0.157, 42.500,	0.614, 58.500,	0.800, 74.500,	0.923, 90.500,
0.006, 11.500,	0.058, 27.500,	0.185, 43.500,	0.643, 59.500,	0.808, 75.500,	0.931, 91.500,
0.010, 12.500,	0.061, 28.500,	0.214, 44.500,	0.671, 60.500,	0.816, 76.500,	0.939, 92.500,
0.013, 13.500,	0.065, 29.500,	0.243, 45.500,	**0.700, 61.500,**	0.824, 77.500,	0.946, 93.500,
0.016, 14.500,	0.068, 30.500,	0.271, 46.500,	0.708, 62.500,	0.831, 78.500,	0.954, 94.500,
0.019, 15.500,	0.071, 31.500,	0.299, 47.500,	0.715, 63.500,	0.839, 79.500,	0.962, 95.500,
0.023, 16.500,	0.074, 32.500,	0.328, 48.500,	0.723, 64.500,	0.846, 80.500,	0.969, 96.500,
0.026, 17.500,	0.078, 33.500,	0.356, 49.500,	0.731, 65.500,	0.854, 81.500,	0.977, 97.500,
0.029, 18.500,	0.081, 34.500,	0.385, 50.500,	0.738, 66.500,	0.862, 82.500,	0.985, 98.500,
0.032, 19.500,	0.084, 35.500,	0.413, 51.500,	0.746, 67.500,	0.869, 83.500,	0.992, 99.500,
0.036, 20.500,	0.087, 36.500,	0.442, 52.500,	0.754, 68.500,	0.877, 84.500,	0.992, 100.500
0.039, 21.500,	0.090, 37.500,	0.470, 53.500,	0.762, 69.500,	0.885, 85.500,	)
0.042, 22.500,	0.094, 38.500,	0.499, 54.500,	0.769, 70.500,	0.892, 86.500,	
0.045, 23.500,	0.097, 39.500,	0.528, 55.500,	0.777, 71.500,	0.900, 87.500,	
0.049, 24.500,	**0.100, 40.500,**	0.557, 56.500,	0.785, 72.500,	0.908, 88.500,	

Data Summary

Number of Data Points = 1000000
Min Data Value = 10
Max Data Value = 100
Sample Mean = 57.4
Sample Std Dev = 19.1

Histogram Summary

Histogram Range = 9.5 to 101
Number of Intervals = 91



Distribution Summary

Distribution: Normal
Expression: NORM(57.4, 19.1)
Square Error: 0.004467

Chi Square Test
Number of intervals = 91
Degrees of freedom = 88
Test Statistic = 3.81e+005
Corresponding p-value < 0.005

Data Summary

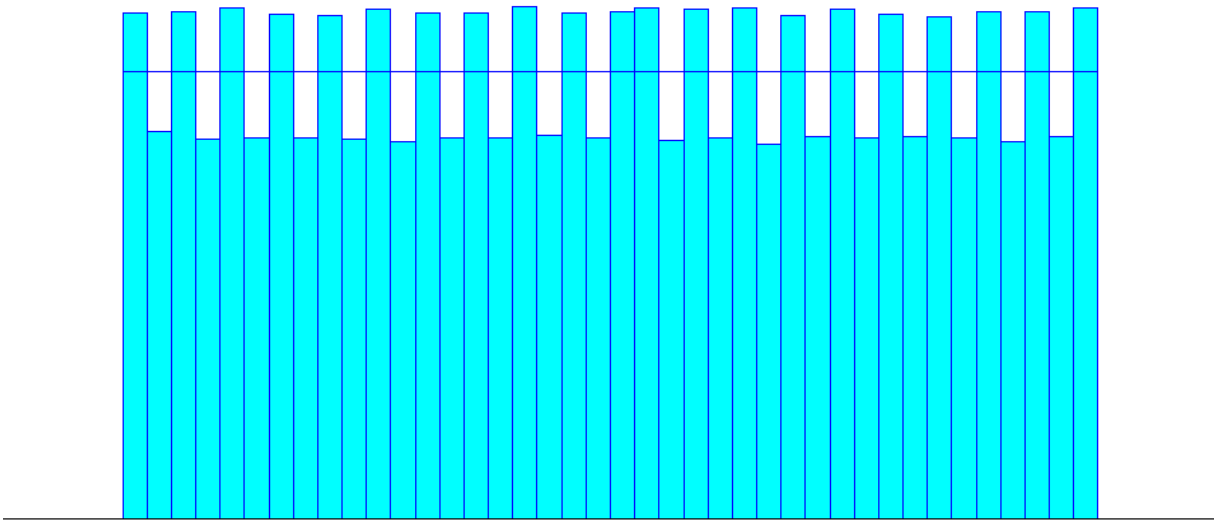
Number of Data Points = 1000000
Min Data Value = 10
Max Data Value = 100
Sample Mean = 57.4
Sample Std Dev = 19.1

Histogram Summary

Histogram Range = 9.5 to 101
Number of Intervals = 91

Generátor 9 – diskrétne rozdelenie – Ťažká oprava

Zložitá oprava
diskrétne rovnomerne Tmin = 120, Tmax = 260



Distribution Summary

Distribution Summary

Distribution: Uniform
Expression: UNIF(120, 260)
Square Error: 0.000504

Chi Square Test
Number of intervals = 40
Degrees of freedom = 39
Test Statistic = 2.02e+004
Corresponding p-value < 0.005

Data Summary

Number of Data Points = 1000000
Min Data Value = 120
Max Data Value = 260
Sample Mean = 190
Sample Std Dev = 40.7

Histogram Summary

Histogram Range = 120 to 260
Number of Intervals = 40