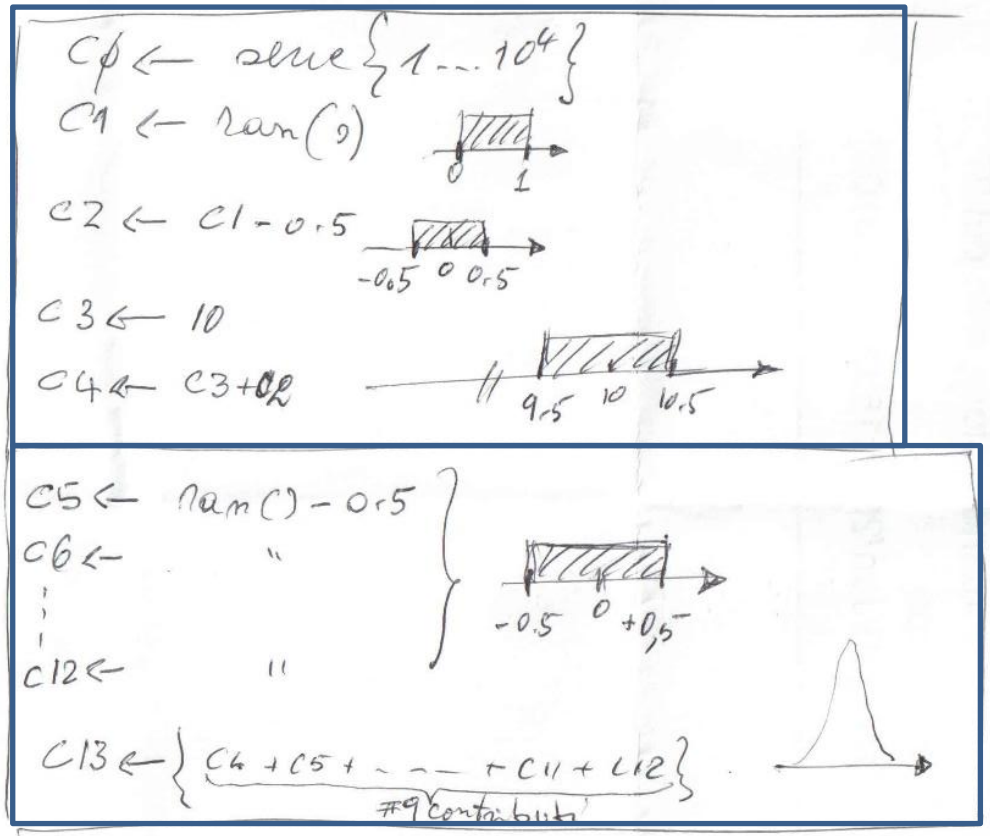
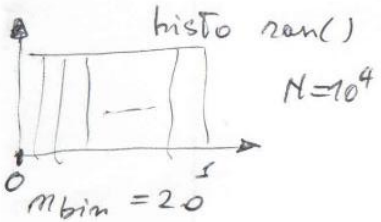
NUMEROLOGIA su Generazione di una GAUSSIANA tramite S/W KALEIDAGRAPH





$\langle\rangle = 0,50055101$

Mediana = 0,500 08178

$\sigma = 0,29000785$

$\sigma_{\langle\rangle} = 0,00290000785$

Skewness = 0,00272458

Kurtosis = -1,2095638

$\epsilon_{bin}^{attesa} = \frac{N}{n_{bin}} = \frac{10'000}{20} = 500$

$\sigma_{attesa} = \frac{max - min}{\sqrt{12}} = \frac{0,9999795 - 0,00011234}{\sqrt{12}}$ (023)

$= \frac{0,99986716}{3,464101615} = 0,28863678$

$\langle\rangle_{attesa} = \frac{max + min}{2} = 0,49995367$

Skewness ≈ 0 ⟷ simmetrica

Kurtosis = 3 + (-1,2095638) = 1,7904362 ↪ no GAUSS

c13	@9 input	@5 input	@3 input	@2 input
	con BIN = 0,5 GAUSS	con BIN = 0,5 GAUSS	con BIN = 0,5 GAUSS	con BIN = 0,2 TRIANGOLARE
mean	9,9992838	10,000783	10,00278	10,003251
Mediana	9,9986629	10,00304	10,007634	10,004753
σ	0,87533211	0,65262459	0,5067263	0,41528696
σ²	0,766 2063	0,42591886	0,25677154	0,17246326
Std. error	0,00875332 11	0,00652624 59	0,00506726 3	0,00415286 96
Skewness	-0,00932 4264	0,00304 13062	-0,01482 3734	-0,01339 166
Kurtosis	-0,12420377	-0,23560868	-0,40878121	-0,6283679

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$$\frac{\sigma_9}{\sigma_5} = \frac{\sqrt{9}\,\sigma_0}{\sqrt{5}\,\sigma_0} = 1{,}341640787 \quad \text{ok}$$

$$\rightarrow = \frac{0{,}87533211}{0{,}65262459} = 1{,}341249048$$

$$\sigma_0 = 0{,}290000785$$

$$\sigma_9 = \sqrt{9}\,\sigma_0 = 0{,}87002355 \quad \text{ok}$$

$$\rightarrow 0{,}87533211$$

$$\frac{\sigma_9}{\sigma_3} = \frac{\sqrt{9}}{\sqrt{3}} = \sqrt{3} = 1{,}732050808 \quad \text{ok}$$

$$\rightarrow = \frac{0{,}87533211}{0{,}50067263} = 1{,}747425851$$

$$\sigma_5 = \sqrt{5}\,\sigma_0 = 0{,}648477266$$

$$\rightarrow 0{,}65262459$$

$$\frac{\sigma_5}{\sigma_3} = \frac{\sqrt{5}}{\sqrt{3}} = 1{,}290994449 \quad \text{ok}$$

$$\rightarrow = \frac{0{,}65262459}{0{,}50067263} = 1{,}287923264$$

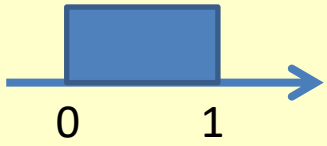
$$\sigma_3 = \sqrt{3}\,\sigma_0 = 0{,}50230833$$

$$\rightarrow 0{,}50067263$$

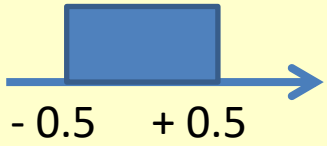
➔ Varianza della somma di più distribuzioni = somma delle varianze delle singole distribuzioni

... Vale in generale anche nel caso di una combinazione lineare ...

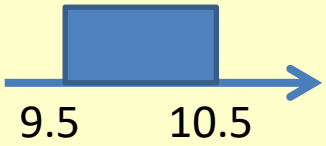
c0 ← serie {1…10000}
c1 ← ran(0)



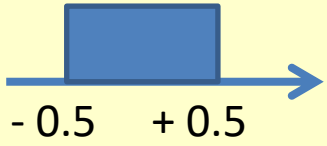
c2 ← c1 – 0.5 [ran() – 0 .5]



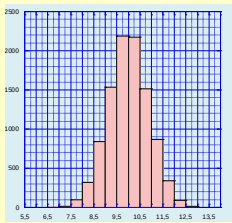
c3 ← 10
c4 ← c3 + c2 [10 + (ran() – 0 .5)]

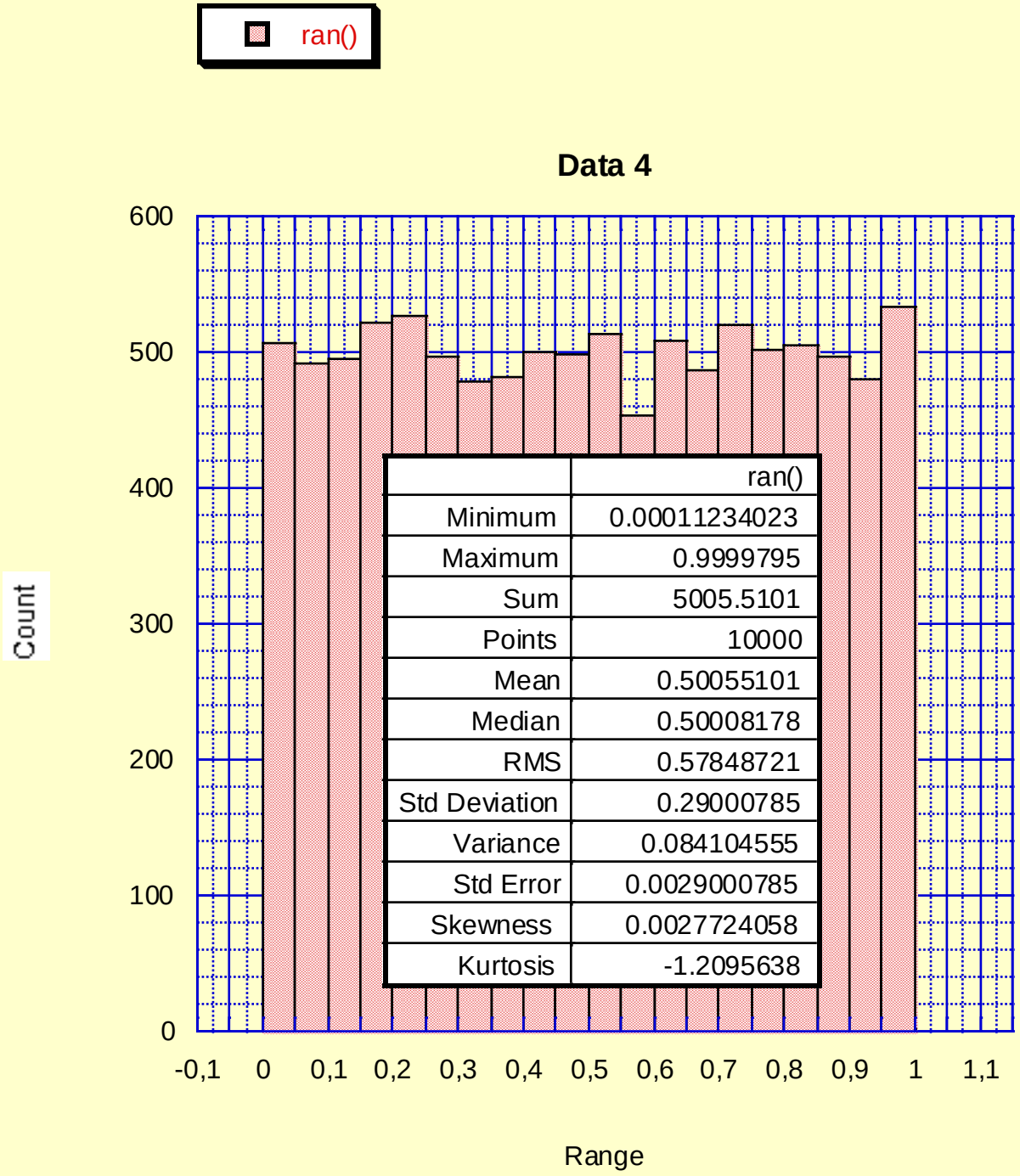


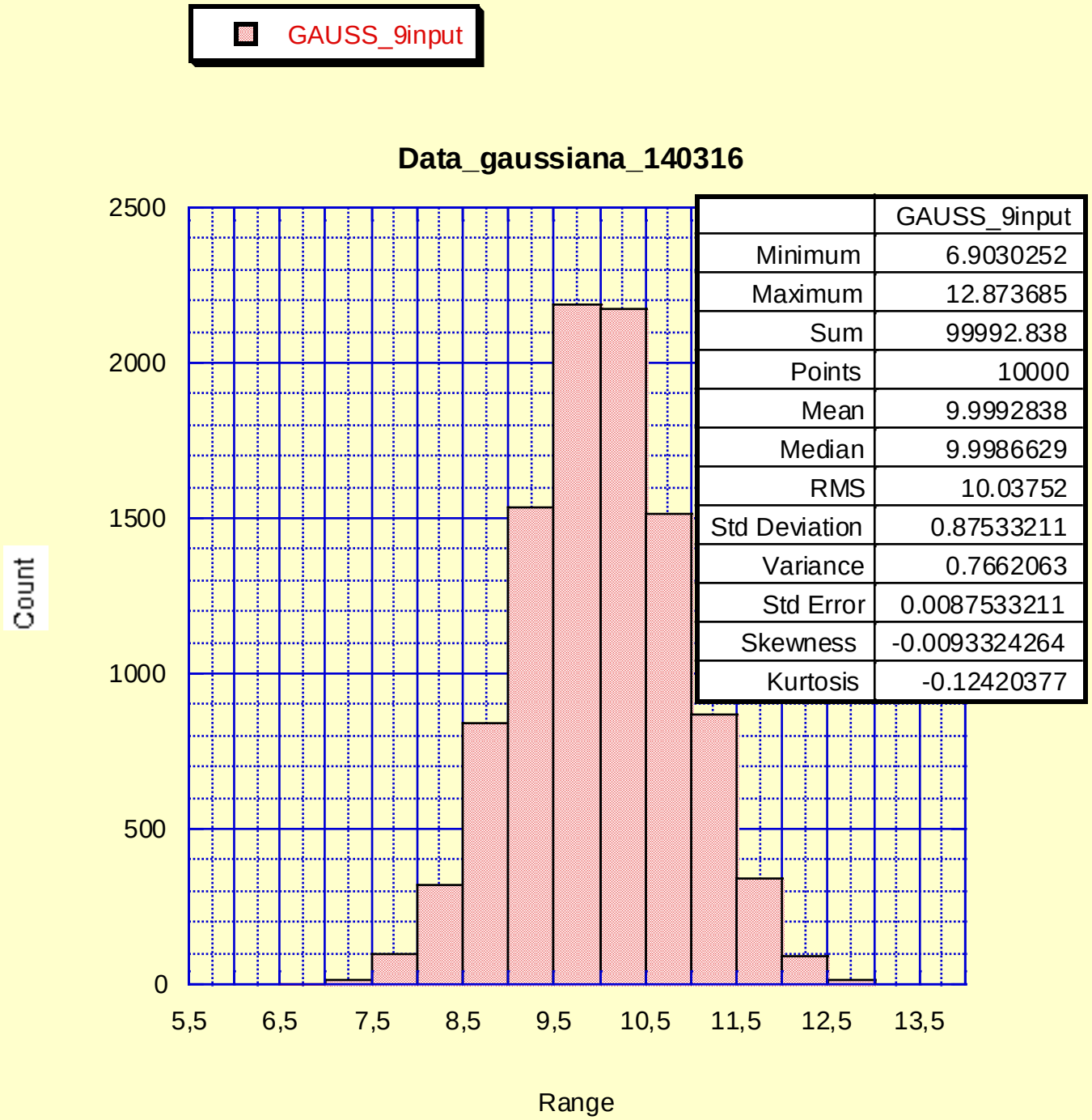
c5 ← ran() – 0.5
c6 ← ran() – 0.5
c7 ← ran() – 0.5
c8 ← ran() – 0.5
c9 ← ran() – 0.5
c10 ← ran() – 0.5
c11 ← ran() – 0.5
c12 ← ran() – 0.5



c13 ← c4 + c5 + c6 + c7 + c8 + c9 + c10 + c11 + c12




ran()
Data 4
600
500
400
300
200
100
0
Count
-0,1
0
0,1
0,2
0,3
0,4
0,5
0,6
0,7
0,8
0,9
1
1,1
Range
ran()
Minimum 0.00011234023
Maximum 0.9999795
Sum 5005.5101
Points 10000
Mean 0.50055101
Median 0.50008178
RMS 0.57848721
Std Deviation 0.29000785
Variance 0.084104555
Std Error 0.0029000785
Skewness 0.0027724058
Kurtosis -1.2095638



	GAUSS_9input
Minimum	6.9030252
Maximum	12.873685
Sum	99992.838
Points	10000
Mean	9.9992838
Median	9.9986629
RMS	10.03752
Std Deviation	0.87533211
Variance	0.7662063
Std Error	0.0087533211
Skewness	-0.0093324264
Kurtosis	-0.12420377

BIN=0.5

Gauss con 9 input (cf. pag. 5)

	O_k	E_k
7,0 – 7,5	10	19,32
7,5 – 8,0	100	93,07
8,0 – 8,5	320	327,08
8,5 – 9,0	840	839,35
9,0 – 9,5	1520	1572,50
9,5 – 10,0	2190	2151,40
10,0 – 10,5	2180	2149,60
10,5 – 11,0	1500	1568,40
11,0 – 11,5	840	835,60
11,5 – 12,0	350	326,63
12,0 – 12,5	100	92,382
12,5 – 13,0	10	19,147
	$N = 9960$	

$N = 10000$

$\langle x \rangle = 9,9987$

$\sigma = 0,88$

$\frac{\sigma}{\sqrt{N}} = 0,0088$

$min = 6,9030$

$max = 12,8737$

$\Delta BIN = 0,5$

$t = \frac{x - \bar{x}}{\sigma(x)}$

x	t	cumulata
7,0	-3,4076	$c_1 = 0,00032768$
7.5	-2,8394	$c_2 = 0,0022599$
8.0	-2,2712	$c_3 = 0,011567$
8.5	-1,7031	$c_4 = 0,044275$
9.0	-1,1349	$c_5 = 0,12821$
9,5	-0,5667	$c_6 = 0,28546$
10,0	+0,0015	$c_7 = 1 - 0,4994 = 0,5006$
10,5	0,5697	$c_8 = 1 - 0,28444 = 0,71556$
11,0	1,1378	$c_9 = 1 - 0,1276 = 0,8724$
11,5	1,7060	$c_{10} = 1 - 0,04404 = 0,95596$
12,0	2,2742	$c_{11} = 1 - 0,011477 = 0,988523$
12.5	2,8424	$c_{12} = 1 - 0,0022388 = 0,997761$
13,0	3,4106	$c_{13} = 1 - 0,0003241 = 0,9996759$

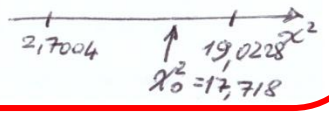
$E_1 = (c_2 - c_1) \cdot N = (0,0022599 - 0,00032768) \cdot 10000 = 19,32$

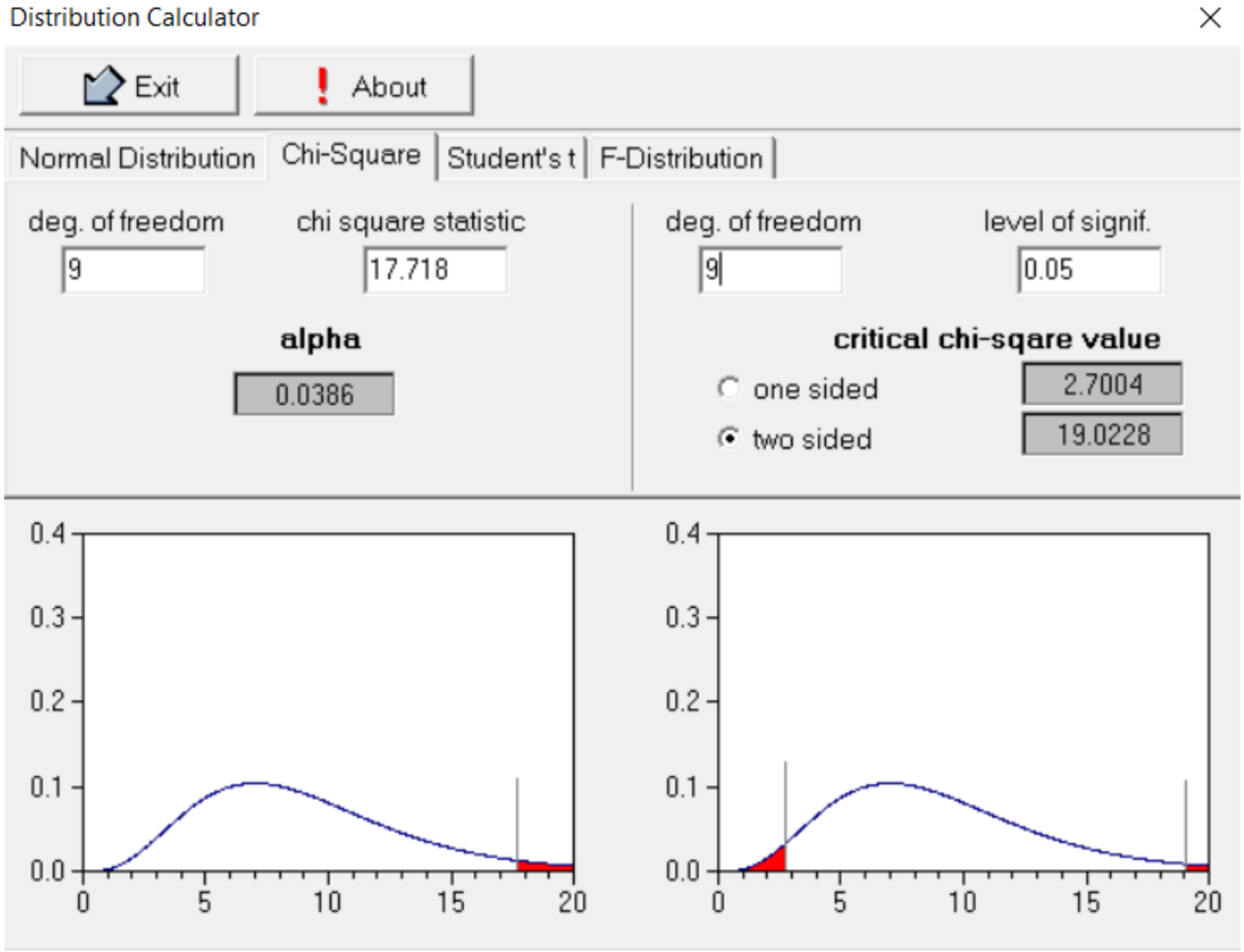
$\chi_0^2 = 4,496 + 0,516 + 0,153 + 0,000503 + 1,753 + 0,693 + 0,430 + 2,983 + 0,0232 + 1,672 + 0,628 + 4,370 = 17,718$

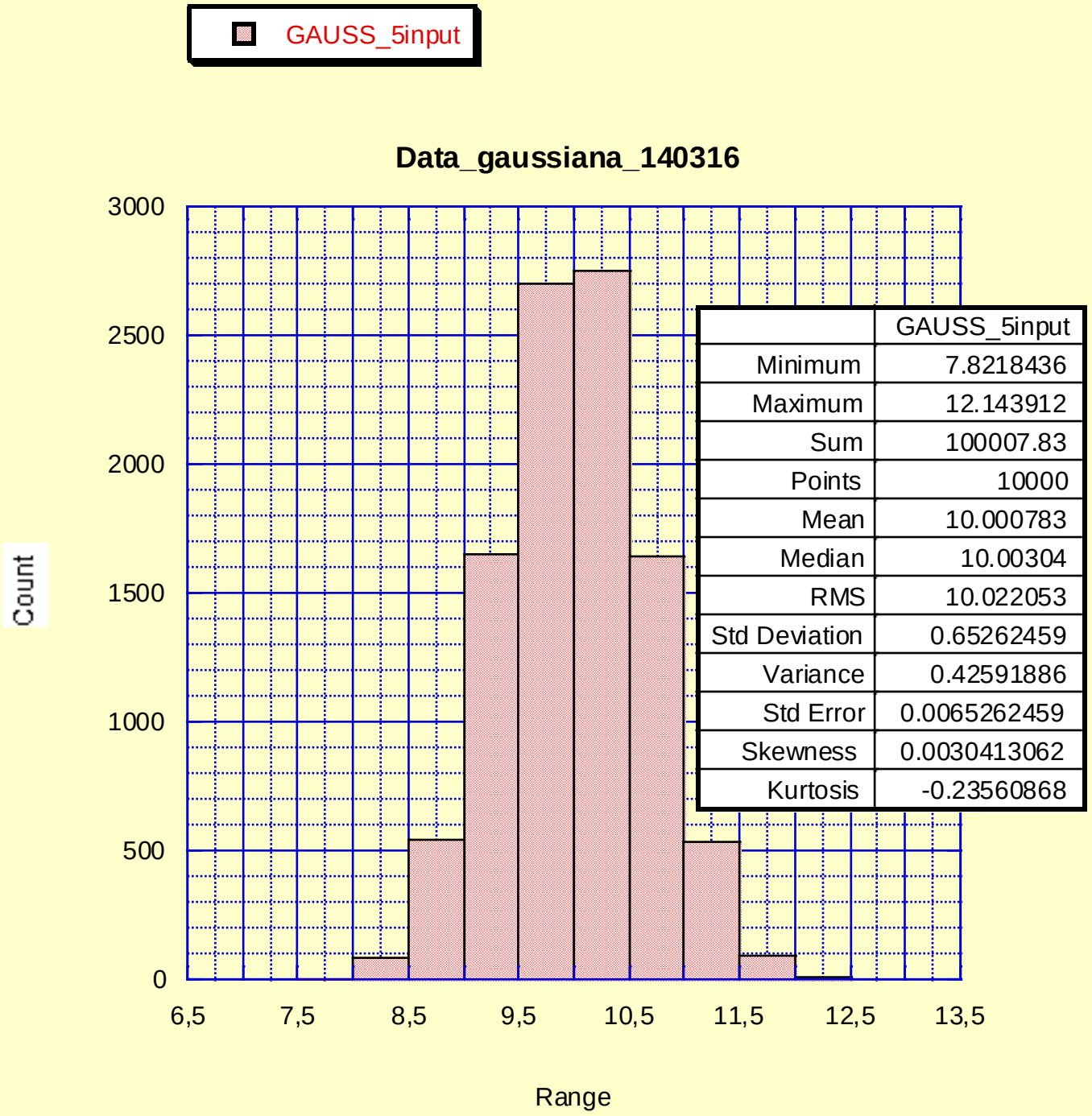
$\nu = 12 - 3 = 9$

$\frac{\chi^2}{\nu} = \frac{17,718}{9} = 1,9687 \Rightarrow$ Ok

L.C. = 95 %

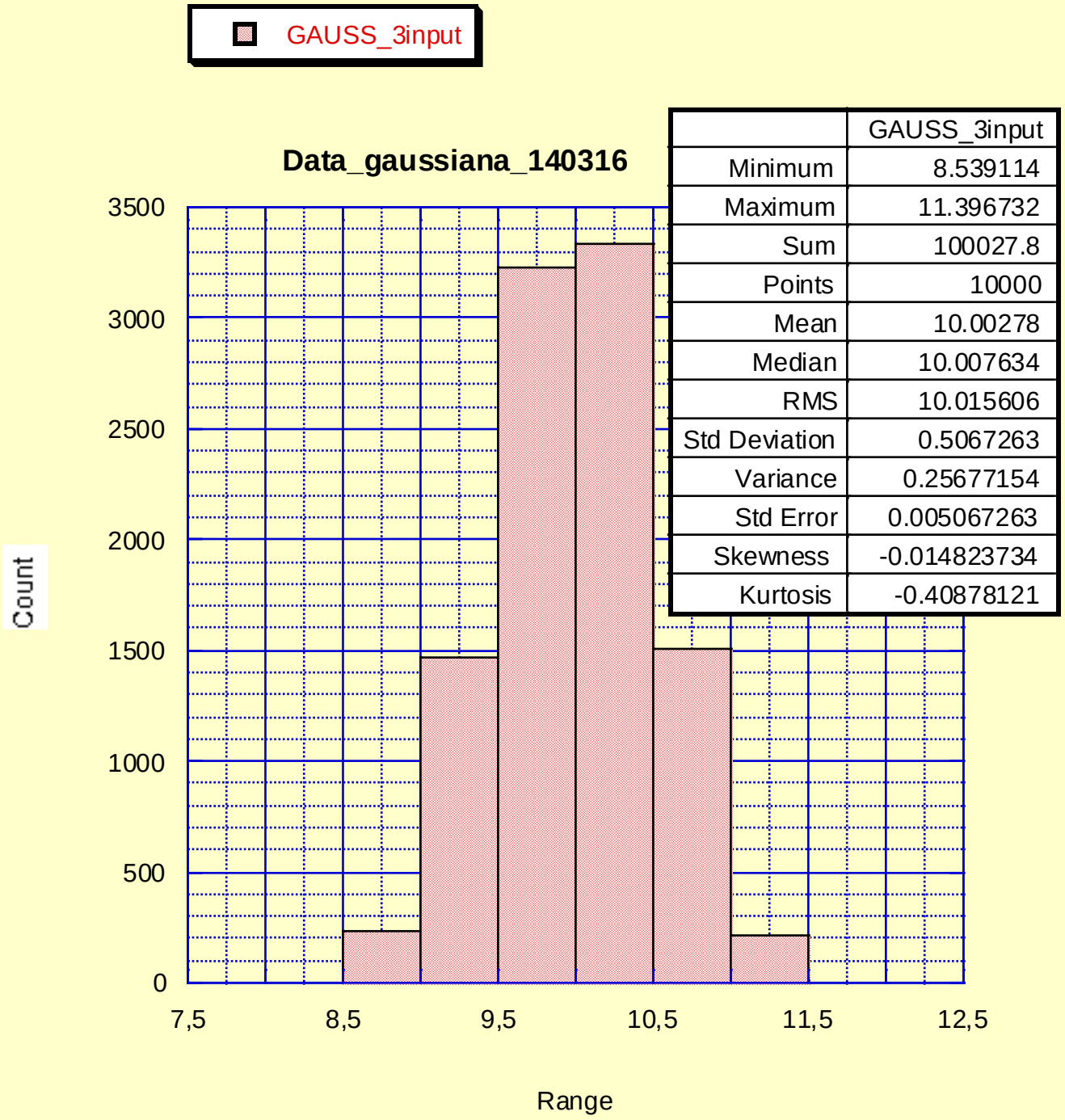



Distribution Calculator
Exit
About
Normal Distribution
Chi-Square
Student's t
F-Distribution
deg. of freedom
9
chi square statistic
17.718
alpha
0.0386
deg. of freedom
9
level of signif.
0.05
critical chi-sqare value
one sided
two sided
2.7004
19.0228
0.4
0.3
0.2
0.1
0.0
0
5
10
15
20



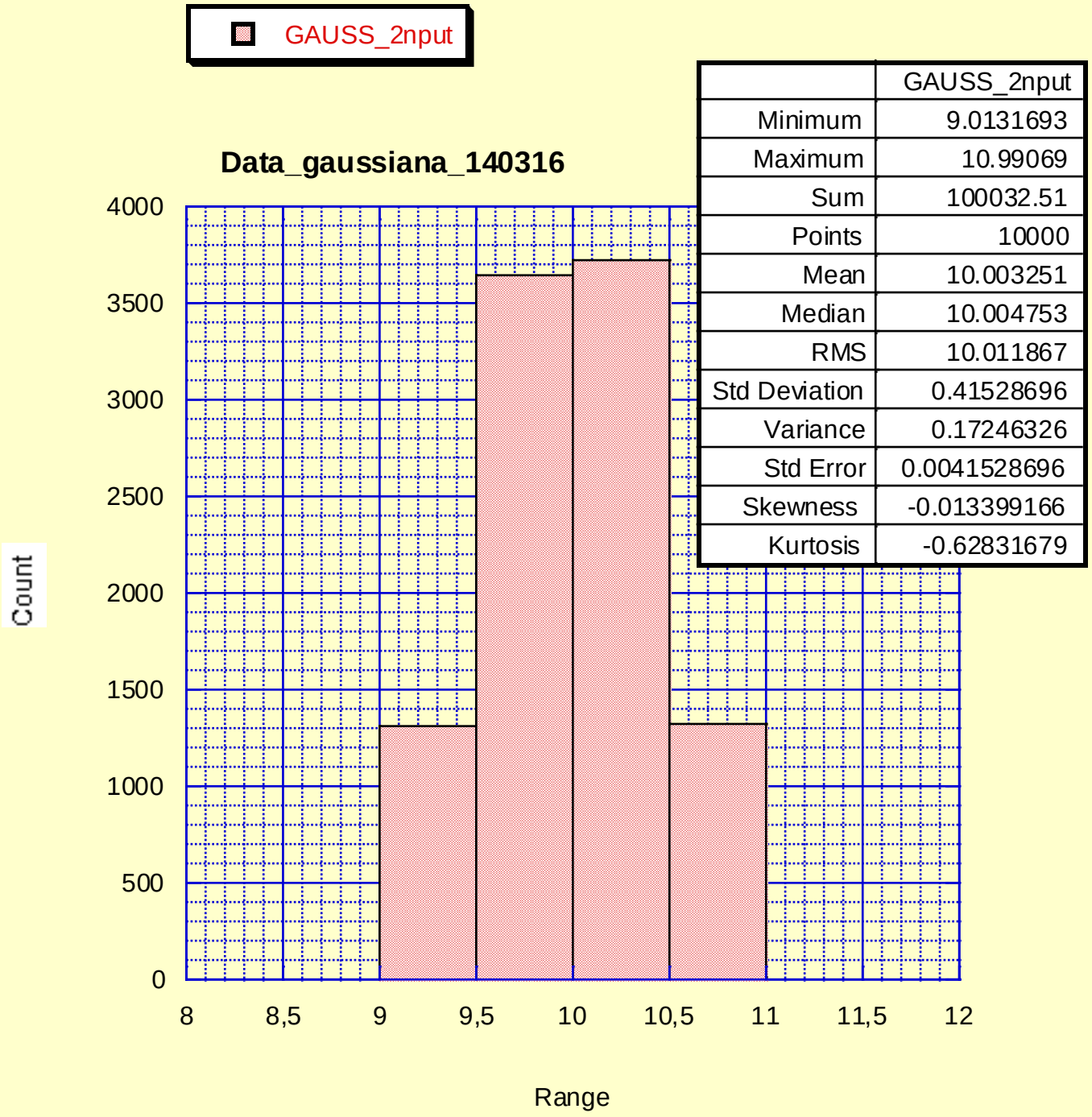
	GAUSS_5input
Minimum	7.8218436
Maximum	12.143912
Sum	100007.83
Points	10000
Mean	10.000783
Median	10.00304
RMS	10.022053
Std Deviation	0.65262459
Variance	0.42591886
Std Error	0.0065262459
Skewness	0.0030413062
Kurtosis	-0.23560868

BIN=0.5



	GAUSS_3input
Minimum	8.539114
Maximum	11.396732
Sum	100027.8
Points	10000
Mean	10.00278
Median	10.007634
RMS	10.015606
Std Deviation	0.5067263
Variance	0.25677154
Std Error	0.005067263
Skewness	-0.014823734
Kurtosis	-0.40878121

BIN=0.5



	GAUSS_2nput
Minimum	9.0131693
Maximum	10.99069
Sum	100032.51
Points	10000
Mean	10.003251
Median	10.004753
RMS	10.011867
Std Deviation	0.41528696
Variance	0.17246326
Std Error	0.0041528696
Skewness	-0.013399166
Kurtosis	-0.62831679

BIN=0.5

Generazione di una gaussiana con kaleidograph. (file = sommario_gaussiana_140316.pdf)

histo di (2) sorgenti casuali ciascuna ripetuta 10'000 volte e addizionate ogni volta per avere N=10'000 valori

$\Delta BIN = 0,5$

$N = 10'000$

$\langle x \rangle = 10,0033$

$\sigma = 0,42$

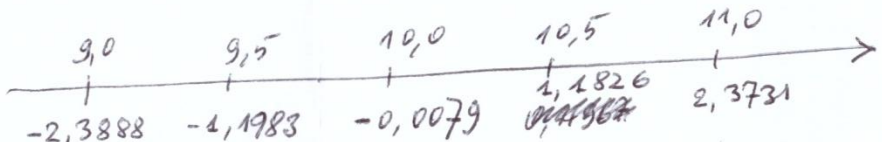
$\frac{\sigma}{\sqrt{N}} = 0,0042$

$min = 9,0132$

$max = 10,9907$

9,0 – 9,5	1300	10'000
9,5 – 10,0	3670	
10,0 – 10,5	3730	
10,5 – 11,0	1300	

$t = \frac{x - \bar{x}}{\sigma(x)}$



Test del χ^2

$c_1 = cum(-2,3888) = 0,0085$

$c_2 = cum(-1,1983) = 0,1154$

$c_3 = cum(-0,0079) = 0,49685$

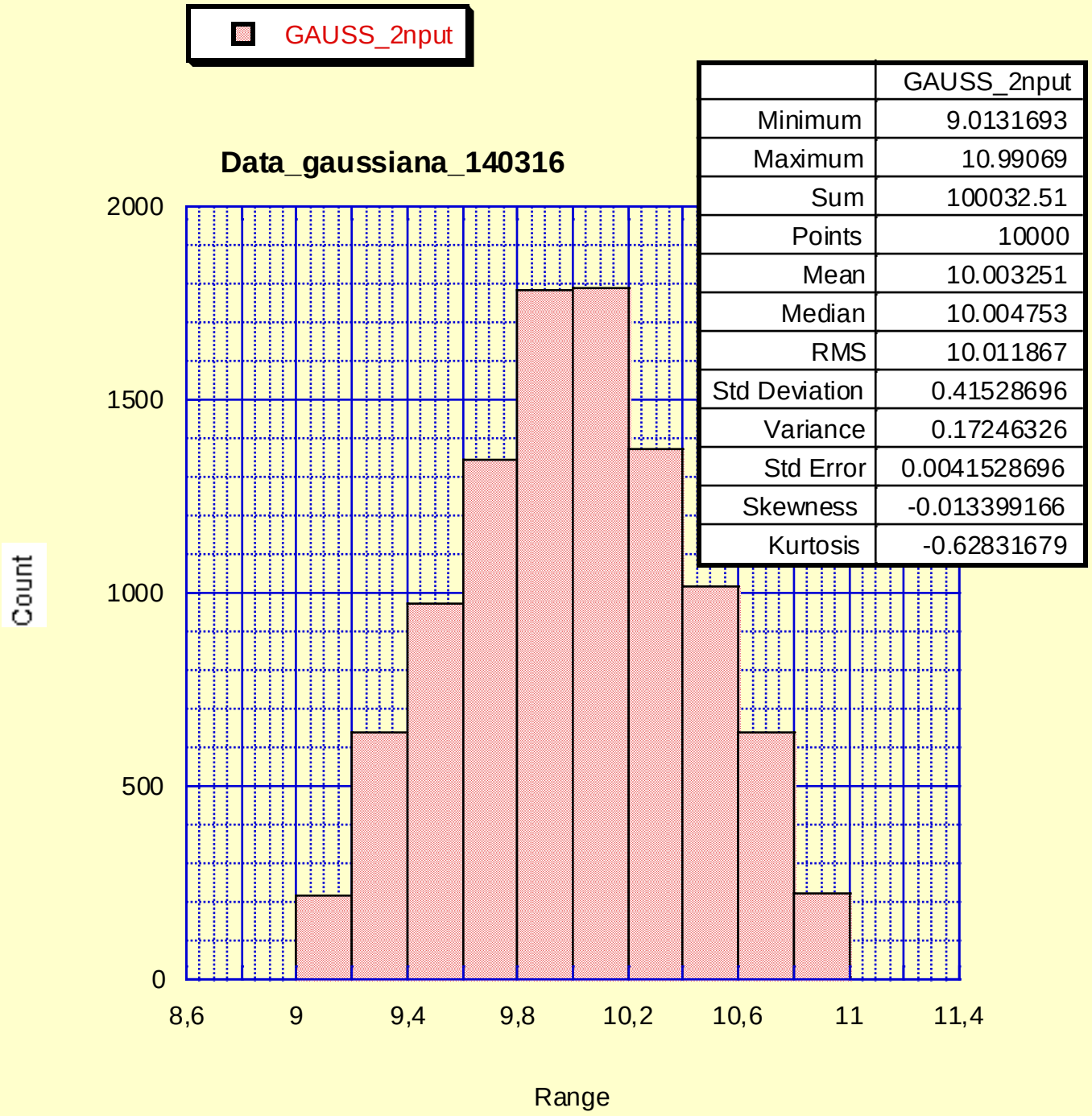
$c_4 = cum(1,1826) = 1 - 0,11848 = 0,88152$

$c_5 = cum(2,3731) = 1 - 0,0088 = 0,9912$

	$(c_2-c_1)\times N = 1069$	$(c_3-c_2)\times N = 3814,5$	$(c_4-c_3)\times N = 3846,5$	$(c_5-c_4)\times N = 1097$
θ_k	1300	3670	3730	1300
$\frac{(E_k-\theta_k)^2}{E_k}$	49,92	5,47	3,53	37,76
	!!			!!

$\nu = 4 - 3 = 1$

NOK !



	GAUSS_2nput
Minimum	9.0131693
Maximum	10.99069
Sum	100032.51
Points	10000
Mean	10.003251
Median	10.004753
RMS	10.011867
Std Deviation	0.41528696
Variance	0.17246326
Std Error	0.0041528696
Skewness	-0.013399166
Kurtosis	-0.62831679

BIN=0.2