

(가)

, , ,
 .

()

가 2

가 2 가

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(Lot) 가

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()

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가

. 가 가

(ㄴ) .

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. ()

(ㄴ) .

()

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가

$$(\mathbb{L})$$

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가

가

가?

가

가?

가

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, Poisson

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가

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12

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•

 (μ) (σ)

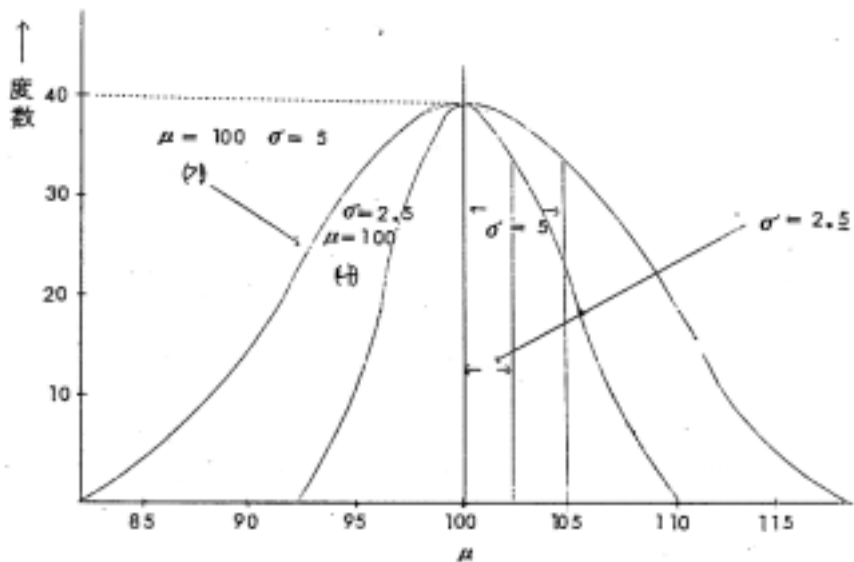
가

$N(\mu \cdot \sigma^2)$



< 12>

,
 13 14
 가 (13)
 가 가 (14).

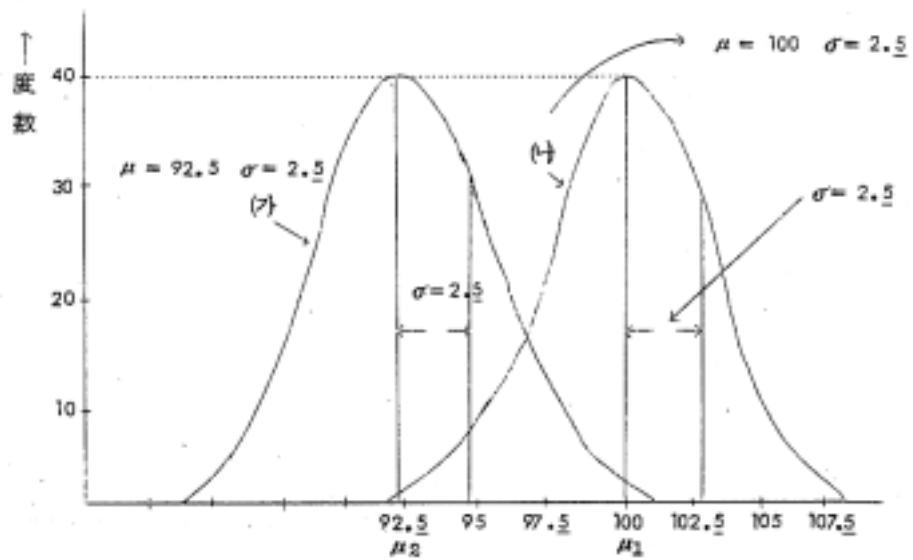


< 13> μ=100, σ=5 μ=100, σ=2.5

13 (가), () 100 가
 5 2.5 σ = 2.5

가

μ , σ^2



< 14> $\mu=100$, $\sigma=2.5$

	13(가)	13()
(μ)	100	100
(σ)	5	2.5
	40	40
	30	15

$$x \sim N(\mu, \sigma^2)$$

$$t = \frac{x - \mu}{\sigma}$$

$$x = \mu \qquad t=0$$

$$x = \mu + \sigma \qquad t=1$$

$$t \sim N(0,1) \qquad .$$

(Standard Normal Distribution)

$$f(t) = \frac{1}{\sqrt{2\pi}} e^{-\frac{t^2}{2}}$$

$$1 \qquad .$$

$$\int_{-\infty}^{\infty} f(t) dt = 1$$

$$, \quad f(t) = \frac{1}{\sqrt{2\pi}} e^{-\frac{t^2}{2}} \qquad \text{가 1} \qquad ($$

10).

$$< 10 >$$

$$\int_{-\infty}^{\infty} f(t) dt = 1$$

$$f(t) = \frac{1}{\sqrt{2\pi}} e^{-\frac{t^2}{2}}$$

$$I = \int_0^{\infty} e^{-\frac{t^2}{2}} dt \qquad I \qquad 2$$

$$I^2 = \int_0^{\infty} e^{-\frac{x^2}{2}} dx \int_0^{\infty} e^{-\frac{y^2}{2}} dy = \int_0^{\infty} \int_0^{\infty} e^{-\frac{(x^2+y^2)}{2}} dx dy \quad \text{가} \quad .$$

$$x = \gamma \cos \theta$$

$$y = \gamma \sin \theta$$

$$x^2 + y^2 = \gamma^2$$

$$dx dy = \gamma d\gamma d\theta$$

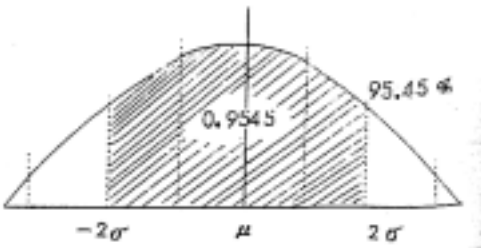
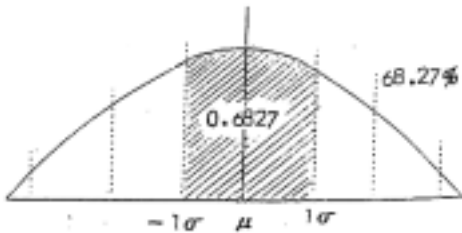
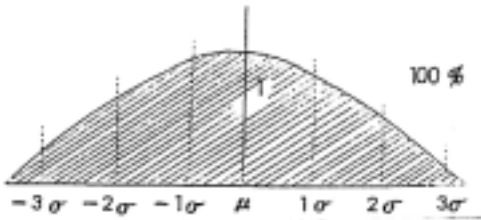
$$I^2 = \int_0^{\frac{\pi}{2}} \int_0^{\infty} e^{-\frac{\gamma^2}{2}} \gamma d\gamma d\theta = \frac{\pi}{2} [-e^{-\frac{\gamma^2}{2}}]_0^{\infty} = \frac{\pi}{2}$$

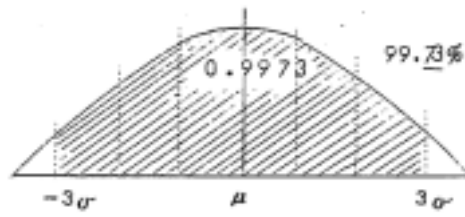
$$I = \sqrt{\frac{\pi}{2}}$$

$$\frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{-\frac{t^2}{2}} dt = 2 \int_0^{\infty} \frac{1}{\sqrt{2\pi}} e^{-\frac{t^2}{2}} dt = 2 \frac{1}{\sqrt{2\pi}} \sqrt{\frac{\pi}{2}} = 1$$

1 가 μ 1 σ, 2 σ, 3 σ

15 .





< 15> $\mu \pm \mu \sigma$

$\mu \pm 1 \sigma$ 68.27%

$\mu \pm 2 \sigma$ 95.45%

$\mu \pm 3 \sigma$ 99.73%

가 가 .

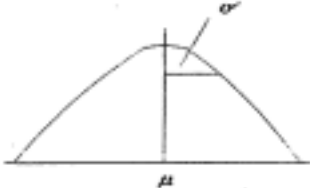
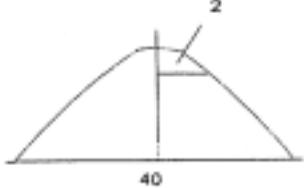
, 가

$N(\mu, \sigma^2)$

가 가 40Denier Nylon filament가 . Filament

2Denier 가 $N(40, \sigma^2)$

8 .

区 分	母 数	統 計 量
平 均 值	μ	40
標 準 偏 差	σ	2
正 規 分 布 의 모 양		

가 Data μ

. μ

? P .

μ , σ 가?

.

σ μ . 가 P

$\mu \pm \mu \sigma$.

	u		P
μ	1	σ	0. <u>6827</u>
μ	2	σ	0. <u>9545</u>
μ	3	σ	0. <u>9973</u>

.

$$t = \frac{x - \mu}{\sigma} \quad t \quad ($$

$$)$$

$$u = \frac{|x - \mu|}{\sigma}$$

$$x = \mu + u \sigma$$

x가 μ σ

가 .

u 가 P

.

$u=3$, $\mu \pm 3\sigma$ 가 0.27%

.

9 u u u 가 P

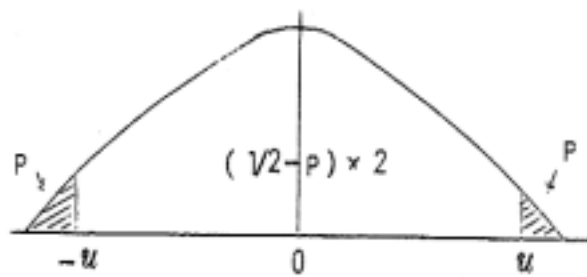
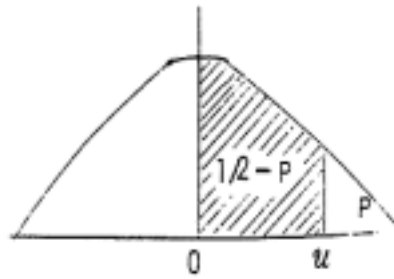
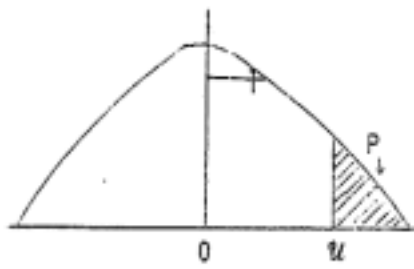
.

p

9 .

$1/2-p$ u .

$-u$ $+u$ $(1/2-p) \times 2$.



< 16>

P

(1)

가 $N(10, 2^2)$

x가 14%

가?

()

$$u = \frac{14-10}{2} = 2$$

9 $u=2$ 1 0.00 p 0.0228 . , 14%

2.28% .

(2)

1 9% 가?

()

$$u = \frac{|9-10|}{2} = 0.5$$

$u = 0.5$ p = 0.3085

, 30.85% .

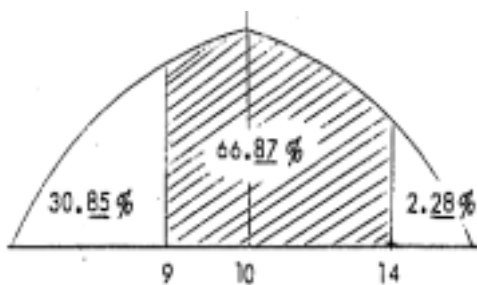
(3)

1 9%~14% 가?

()

$$p = 1-0.3085-0.0228=0.6687$$

, 66.87% .



(4)

62kg

. Data $\mu = 64\text{kg}$, $\sigma = 1\text{kg}$.

62kg

가?

()

$$18 + 3 \times 0.2 = 18.6\%$$

$$u = \frac{|62 - 64|}{1} = 2$$

$$u=2 \quad 9 \quad p=0.0228 \quad 2.28\% .$$

62kg

2.28%

.

(5)

Bulky Yarn

18%,

가 0.2%

Data .

$$17.8\% \pm 0.25\%$$

Data

가?

$$18 + 3 \times 0.2 = 18.6\%$$

$$u = \frac{|18.6 - 18|}{0.2} = 3$$

$$u = 3 \quad 9 \quad p=0.0013$$

, 0.13% .

$$18 - 3 \times 0.2 = 17.4\%$$

$$u = \frac{17.4 - 18}{0.2} = 3$$

$$p=0.0013$$

$0.13\%+0.13\%=0.26\%$.

.

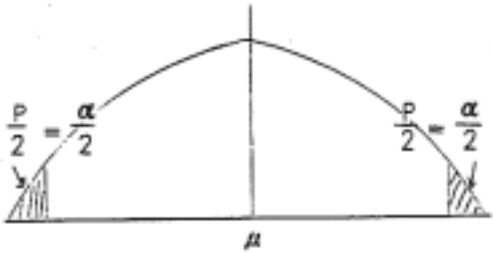
95%가

()

.

p 가 σ

.



< 17>

A 50kg 가 2kg

A 95%가 $50 \pm 1.96 \times 2=50 \pm$

3.9kg 가 . $[N(\mu, \sigma^2)$

가 (1-σ) $\mu \pm u \sigma$] _____

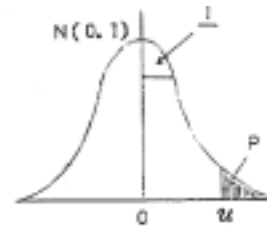
_____, _____가 .

가 0.5 .

Sample 40kg

40 ± 1.96 95% 가) ,
 $39.02 \sim 40.98 \text{kg}$. [σ^2
 x (1- α) 가 $x \pm u \delta$
] 가 .
가 가? 가?
. 가
, 가 .

$$P = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{-\frac{u^2}{2}} \phi(u)$$



u → P

u	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010