Statistics
Spring 2023
Lecture 35

Feb 19-8:47 AM

Suppose ages of all College students are normally distributed with the mean of 30 yrs and standard deviation of 5 yrs. $N(30, 5)$

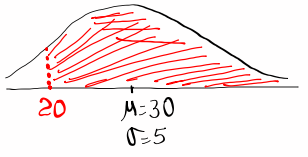
If we randomly select one student, find the prob. that his/her (x) age is

1) above 20 yrs.

$P(x > 20)$

= normalcdf(20, E99, 30, 5)

$\simeq$ .977

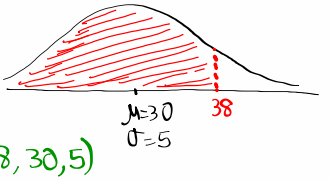


2) below 38 yrs.

$P(x < 38)$

= normalcdf(-E99, 38, 30, 5)

= .945



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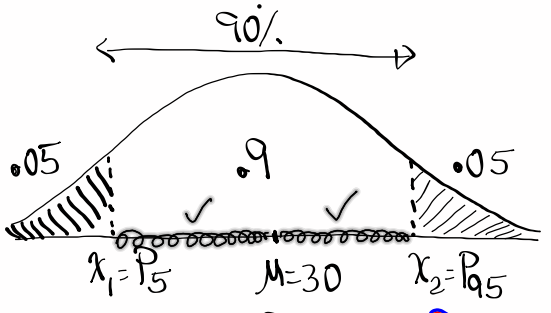
3) Find two ages, round to whole numbers, that separate the middle 90% from the rest.

$1 - .9 = .1$

$.1 \div 2 = .05$



$x_1 = P_5 = \text{invNorm}(.05, 30, 5)$

$= 21.776$

$\approx \boxed{22}$

$x_2 = P_{95} = \text{invNorm}(.95, 30, 5)$

$= 38.224$

$\approx \boxed{38}$

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SC:20

Clear all lists.

Store 2, 6, 10, and 14 in L1.

Use 1-Var Stats with L1 only To find

$\mu = \bar{x} = 8$ $\quad \sigma = \sigma_x = 4.472$ $\quad \sigma^2 = 20$

Take all Samples of Size 2 with replacement from this list.

2,2	2,6	2,10	2,14
6,2	6,6	6,10	6,14
10,2	10,6	10,10	10,14
14,2	14,6	14,10	14,14

Now find $\bar{x}$ of each Sample.

2	4	6	8
4	6	8	10
6	8	10	12
8	10	12	14

16 means

$\bar{x}$	$P(\bar{x})$
2	1/16
4	2/16
6	3/16
8	4/16
10	3/16
12	2/16
14	1/16

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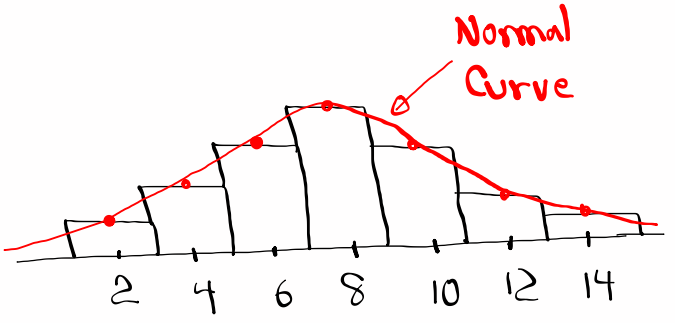
L2 $\bar{x}$	L3 $P(\bar{x})$
2	1/16
4	2/16
6	3/16
8	4/16
10	3/16
12	2/16
14	1/16

Draw Prob. dist. histogram



$\bar{x}$ → L2, $P(\bar{x})$ → L3

Use 1-Var Stats with L2 & L3

to find

$\mu = 8$

$\sigma = 3.162$

$\sigma^2 = 10 = \frac{20}{2}$

Apr 17-8:07 AM

Clear all lists.

Store 2, 4, 6, 8, and 10 in L1

Use 1-Var Stats with L1 only to find

$\mu = 6$ $\sigma = 2.828$ $\sigma^2 = 8$

Now take all samples of size 2 with replacement from this list.

2,2	2,4	2,6	2,8	2,10
4,2	4,4	4,6	4,8	4,10
6,2	6,4	6,6	6,8	6,10
8,2	8,4	8,6	8,8	8,10
10,2	10,4	10,6	10,8	10,10

Now find $\bar{x}$ of each sample.

2	3	4	5	6
3	4	5	6	7
4	5	6	7	8
5	6	7	8	9
6	7	8	9	10

25 means

$\bar{x}$	$P(\bar{x})$
2	1/25
3	2/25
4	3/25
5	4/25
6	5/25
7	4/25
8	3/25
9	2/25
10	1/25

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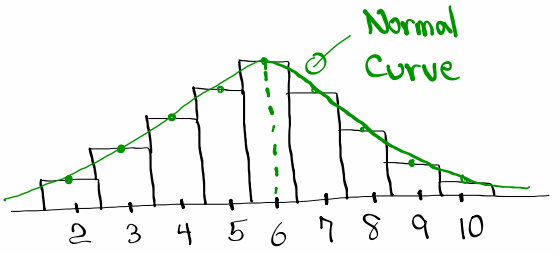
$\bar{x}$	$P(\bar{x})$
2	1/25
3	2/25
4	3/25
5	4/25
6	5/25
7	4/25
8	3/25
9	2/25
10	1/25

Draw Prob. dist. histogram



$\bar{x} \rightarrow$ L2, $P(\bar{x}) \rightarrow$ L3

Use [1-Var Stats] with L2 & L3 to find

$\mu = 6$ $\quad \sigma = 2 \quad \sigma^2 = 4 = \frac{8}{2}$

SG 18
SG 19 $\Rightarrow$ Refresh your browser.

Apr 17-8:23 AM

Central – Limit Theorem

$$\mu_{\bar{x}} = \mu$$

$$\sigma_{\bar{x}}^2 = \frac{\sigma^2}{n}$$

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

Clear all lists

Store 2, 4, 6, 8, 10, and 12 in L1.

Use [1-Var Stats] with L1 only to find

$\mu = 7$ $\quad \sigma = 3.416 \quad \sigma^2 = \frac{35}{3}$

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Now take all Samples with Size 2 with replacement from this list.

2,2	2,4	2,6	2,8	2,10	2,12
4,2	4,4	4,6	4,8	4,10	4,12
6,2	6,4	6,6	6,8	6,10	6,12
8,2	8,4	8,6	8,8	8,10	8,12
10,2	10,4	10,6	10,8	10,10	10,12
12,2	12,4	12,6	12,8	12,10	12,12

36 of them

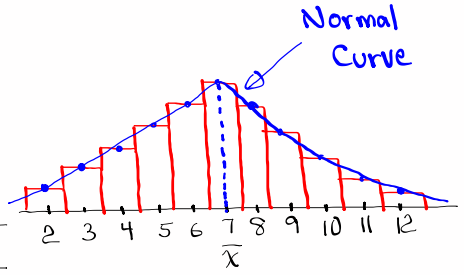
Now find $\bar{x}$ of each Sample

2	3	4	5	6	7
3	4	5	6	7	8
4	5	6	7	8	9
5	6	7	8	9	10
6	7	8	9	10	11
7	8	9	10	11	12

36 means

Apr 18-7:40 AM

$\bar{x}$	$P(\bar{x})$
2	1/36
3	2/36
4	3/36
5	4/36
6	5/36
7	6/36
8	5/36
9	4/36
10	3/36
11	2/36
12	1/36



$\bar{x} \rightarrow L2$ $P(\bar{x}) \rightarrow L3$

use 1-Var Stats with L2 & L3 to find

$\mu = 7$ $\sigma = 2.415$ $\sigma^2 = \frac{35}{6} = \frac{\frac{35}{3}}{2}$

So by CLT

$\mu_{\bar{x}} = \mu$ ✓ $\sigma^2_{\bar{x}} = \frac{\sigma^2}{n}$ ✓ $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

Apr 18-7:47 AM

Suppose a population has a normal dist with $\mu = 175$ and $\sigma = 20$.

If we randomly draw samples of size 16, find

$\mu_{\bar{x}} = \mu = \boxed{175}$ $\quad \sigma_{\bar{x}}^2 = \frac{\sigma^2}{n} = \frac{20^2}{16} = \boxed{25}$ $\quad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{20}{\sqrt{16}} = \boxed{5}$

Apr 18-7:58 AM

Salaries of nurses are normally dist. with the mean of \$6200/month and standard deviation of \$400/month.

If we randomly take all samples of size 25, find

$\mu_{\bar{x}} = \mu = \boxed{6200}$ CLT $\quad \sigma_{\bar{x}}^2 = \frac{\sigma^2}{n}$ CLT $= \frac{400^2}{25} = \boxed{6400}$ $\quad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$ CLT $= \frac{400}{\sqrt{25}} = \boxed{80}$

SG 20

"You can do the first 3 pages"

Apr 18-8:01 AM