Statistics

Lecture 11

Feb 19-8:47 AM

Class QZ 6

x	P(x)
1	.1
2	.2
3	.5
4	.2

L1 L2

Find

1) μ = 2.8

2) σ = .9

1-Var Stats
L1 & L2

Round to 1-decimal

3) σ^2 = $\frac{19}{25}$

Reduced fraction

VARS | 5: Statistics | 4: σx

x^2 | MATH | 1: Dfrac | Enter

Jul 15-7:02 PM

Suppose we have a binomial prob. dist. with $n=40$ & $p=.7$.

1) $q = 1-p$
$= 1-.7 = \boxed{.3}$

2) $\mu = np = 40(.7) = \boxed{28}$

3) $\sigma^2 = npq = 40(.7)(.3)$
$= \boxed{8.4}$

4) $\sigma = \sqrt{\sigma^2} = \sqrt{8.4}$
$= \boxed{2.898}$

$\mu = 28$
$\sigma = 3$

Round μ & σ to whole #, then find

usual Range (95% Range) $\mu \pm 2\sigma = 28 \pm 2(3)$
$= 28 \pm 6 \Rightarrow \boxed{22 \text{ to } 34}$

Jul 16-4:36 PM

Find the prob. that # of successes is

a) below 25
$P(x < 25) = P(x \le 24) = \text{binomcdf}(40, .7, 24)$
$= \boxed{.115}$

b) above 30
$P(x > 30) = P(x \ge 31) = 1 - P(x \le 30)$
$= 1 - \text{binomcdf}(40, .7, 30)$
$= \boxed{.196}$

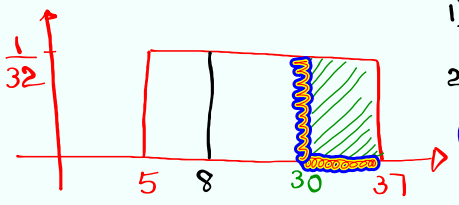
30 31

c) between 22 & 34, inclusive.
$P(22 \le x \le 34) = \text{binomcdf}(40, .7, 34) - \text{binomcdf}(40, .7, 21)$
$= \boxed{.977}$

usual Range

Jul 16-4:41 PM

Consider a Uniform Prob. dist. for all values from 5 to 37.



1) $P(x=8)=0$

2) $P(x>30)$

$(37-30)\cdot\frac{1}{32}$

$=\frac{7}{32}$

Find a value, Round to 1-decimal that separates the top 40% from the rest.

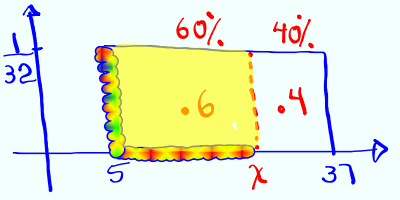
$(x-5)\cdot\frac{1}{32}=.6$

$x-5=32(.6)$

$x-5=19.2$

$x=19.2+5$

$x=24.2$ P_{60}



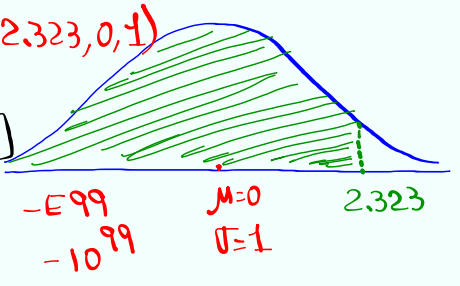
Jul 16-4:49 PM

Find $P(z<2.323)$

=normalcdf(-E99, 2.323, 0, 1)

(-) 2nd [)]

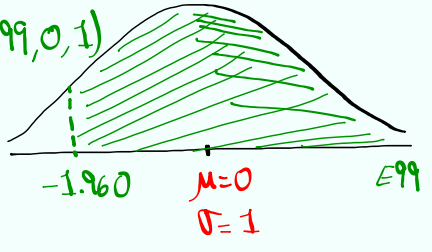
= .990



Find $P(z>-1.960)$

=normalcdf(-1.960, E99, 0, 1)

= .975

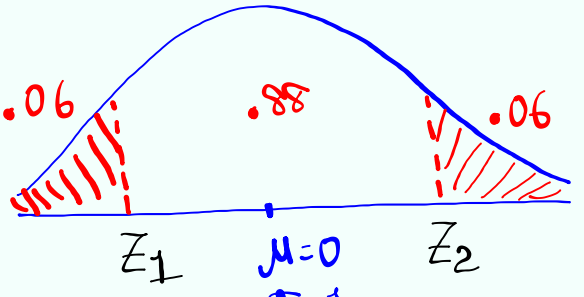


Jul 16-4:56 PM

Find two Z-values, round to 3-decimal places, that Seperate the middle 88% from the rest.

$1 - .88 = .12$

$.12 \div 2 = .06$



$Z_1 = \text{invNorm}(.06, 0, 1) = -1.555$

$Z_2 = \text{invNorm}(.94, 0, 1) = 1.555$

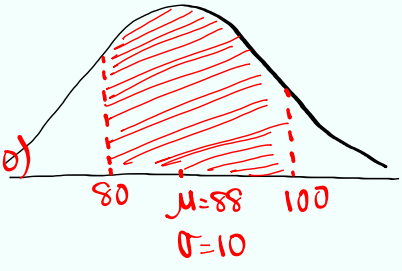
Jul 16-5:04 PM

Consider a normal Prob. dist. with $\mu=88$ and $\sigma=10$.

1) $P(80 < x < 100)$

$= \text{normalcdf}(80, 100, 88, 10)$

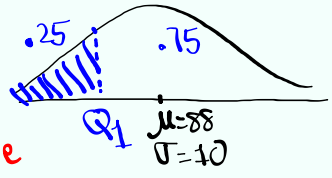
$= .673$



2) find $x = Q_1$

25% below

75% above



$x = Q_1 = \text{invNorm}(.25, 88, 10)$

$= 81.255$

Round-up

82

Jul 16-5:08 PM

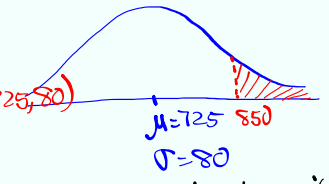
Credit Scores are normally dist. with mean of 725 and Standard dev. of 80.

Find the prob. that Credit Score of a random person is **above 850.**

$P(x>850)$

= normalcdf(850, E99, 725, 80)

= .059

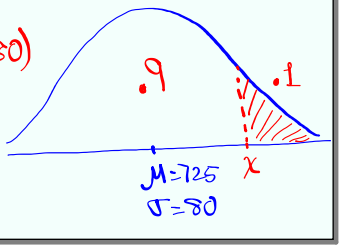


BofA Says that they finance the top 10% of credit scores. Find the cutoff Score.

x = invNorm(.9, 725, 80)

= 827.524

≈ 828



Jul 16-5:15 PM

Clear all lists.

Store the following in L1.

2, 4, 6, 8

Use **1-Var Stats** with L1 only to find

$\mu = 5$ $\sigma = 2.236$ σ^2 (exact) $= 5$

Let's take all possible Samples of **Size 2** from this list with replacement.

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

16 of them

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

2	3	4	5
3	4	5	6
4	5	6	7
5	6	7	8

Jul 16-5:22 PM

2	3	4	5
3	4	5	6
4	5	6	7
5	6	7	8

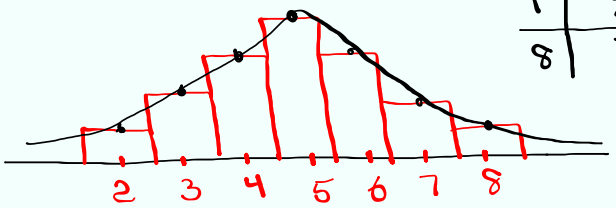
16 $\bar{x}$

$\bar{x}$	$P(\bar{x})$
2	1/16
3	2/16
4	3/16
5	4/16
6	3/16
7	2/16
8	1/16

$\bar{x} \Rightarrow$ L2

$P(\bar{x}) \Rightarrow$ L3

Use 1-Var Stats with L2 & L3



Find

$\mu = 5$

$\sigma = 1.581$

$\sigma^2 = 2.5 = \frac{5}{2}$

Jul 16-5:30 PM

Clear all lists.

Store the following in L1.

2, 4, 6, 8, 10

Use 1-Var Stats with L1 only to find

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

Find 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

25 Samples

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

Jul 16-5:50 PM

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

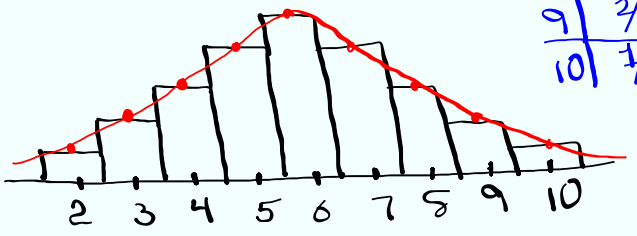
$25\ \bar{x}$

$\bar{x}$	$P(\bar{x})$
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

$\bar{x} \rightarrow L2$

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

Use 1-Var Stats with L2 & L3



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

Jul 16-5:57 PM

Central Limit Theorem

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

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

Consider a normal Prob. dist with $\mu = 85$ & $\sigma = 10$

If we take all samples of size 4

$\mu_{\bar{x}} = \mu = 85$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{10}{\sqrt{4}} = \frac{10}{2} = 5$

Jul 16-6:04 PM

Salaries of all nurses are normally dist. with $\mu = \$8200/\text{mo.}$ & $\sigma = \$400/\text{mo.}$

If we randomly select samples of 16 nurses,

$$\mu_{\bar{x}} = \mu = 8200$$

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{400}{\sqrt{16}} = \frac{400}{4} = 100$$

Jul 16-6:08 PM

Exam scores are normally dist. with $\mu = 86$ and $\sigma = 10$.

If we randomly select 4 exams, find the prob. that their mean is between 80 & 90.

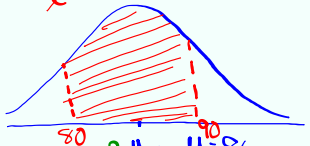
$n = 4$

$\bar{x}$

$P(80 < \bar{x} < 90)$

= normalcdf(80, 90, 86, 5)

= .673



CLT $\mu_{\bar{x}} = \mu = 86$, $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{10}{\sqrt{4}} = 5$

Find $\bar{x} = Q_3$, Round to whole #, for randomly selected 3 exams.

$\bar{x}$ = invNorm(.75, 86, $10/\sqrt{3}$)

= 89.894

≈ 90

CLT $\mu_{\bar{x}} = \mu = 86$, $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{10}{\sqrt{3}}$

Jul 16-6:11 PM

Ages of students are N.D. with $\mu = 32.5$ yrs and $\sigma = 7.5$ yrs.

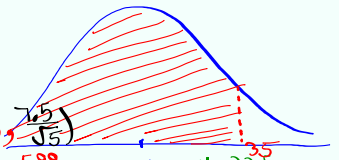
If we randomly select 5 students, find the Prob. that their mean age ($\bar{x}$) is below 35.

$n = 5$

$P(\bar{x} < 35)$

$= \text{normalcdf}(-E99, 35, 32.5, \frac{7.5}{\sqrt{5}})$

$= .772$

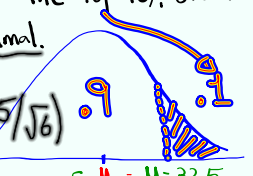


CLT $\begin{cases} \mu_{\bar{x}} = \mu = 32.5 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{7.5}{\sqrt{5}} \end{cases}$

Find $\bar{x}$ for randomly selected group of 6 students that seperates the top 10% from the rest. Round to 1-decimal.

$\bar{x} = \text{invNorm}(.9, 32.5, 7.5/\sqrt{6})$

$= 36.424 = 36.4$



CLT $\begin{cases} \mu_{\bar{x}} = \mu = 32.5 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{7.5}{\sqrt{6}} \end{cases}$

Jul 16-6:21 PM

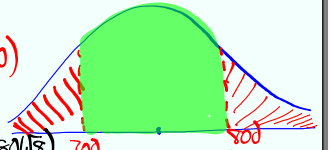
Credit scores are N.D. with $\mu = 725$ and $\sigma = 80$.

If we randomly select 8 people, find the Prob. that their mean credit score is below 700 OR above 800.

$P(\bar{x} < 700 \text{ OR } \bar{x} > 800)$

$= 1 - \text{normalcdf}(700, 800, 725, \frac{80}{\sqrt{8}})$

$= .192$

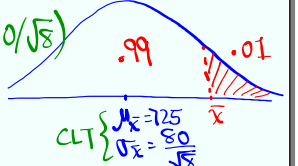


CLT $\begin{cases} \mu_{\bar{x}} = \mu = 725 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{80}{\sqrt{8}} \end{cases}$

Find mean credit score ($\bar{x}$) for group of 8 that seperates the top 1% from the rest.

$\bar{x} = \text{invNorm}(.99, 725, 80/\sqrt{8})$

≈ 791



CLT $\begin{cases} \mu_{\bar{x}} = 725 \\ \sigma_{\bar{x}} = \frac{80}{\sqrt{8}} \end{cases}$

Jul 16-6:32 PM