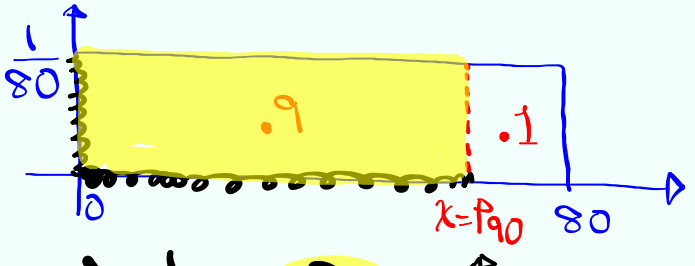
Statistics

Lecture 36

Feb 19-8:47 AM

Consider a uniform prob. dist. for all values from 0 to 80.

Find $x = P_{90}$, Round to a whole # if needed.



$(x - 0) \cdot \frac{1}{80} = .9$

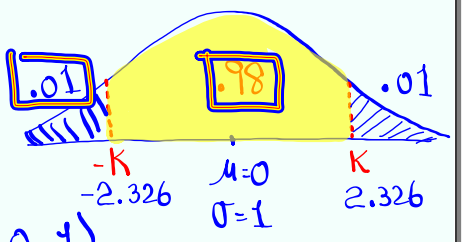
$x - 0 = 80(.9) \rightarrow x = 72$

Nov 4-8:48 AM

Find k such that $P(-k<Z<k)=.98$

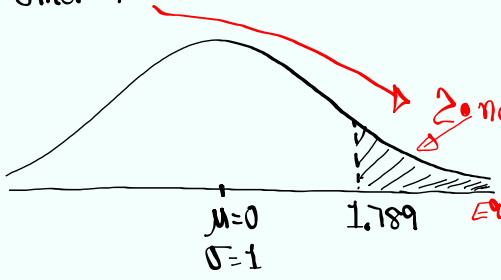
$1-.98=.02$

$.02\div 2=.01$



$k=\text{invNorm}(.99, 0, 1) = \boxed{2.326}$

Find twice the shaded area below

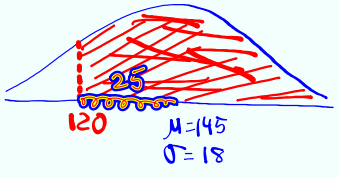


$2\cdot\text{normalcdf}(1.789, E99, 0, 1) \approx \boxed{.074}$

Nov 4-8:52 AM

Consider a normal Prob. dist. with $\mu=145$ and $\sigma=18$.

1) $P(x>120)$



$=\text{normalcdf}(120, E99, 145, 18)$

$\approx \boxed{.918} \approx 92\%$

2) $P(x<170)$

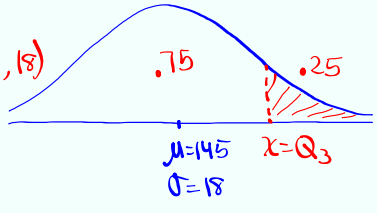
$=\text{normalcdf}(-E99, 170, 145, 18)$

$\approx \boxed{.918} \approx 92\%$

3) Find $x=Q_3$, Round to whole #

$x=\text{invNorm}(.75, 145, 18)$

$\approx \boxed{157}$



Nov 4-8:59 AM

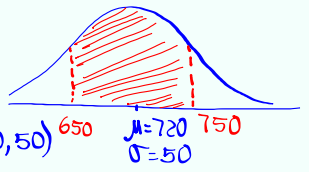
Credit Scores are normally dist with mean of 720 and standard dev. of 50.

If one person is selected, find the prob. that his/her Credit Score (x) is between 650 & 750.

$P(650 < x < 750)$

=normalcdf(650, 750, 720, 50)

$\approx$ .645



Find a Credit Score that separates the bottom 30% from the rest.

x=invNorm(.3, 720, 50)

$\approx$ 694

left Area

Nov 4-9:07 AM

Store 3, 5, 7, and 9 in L1, use 1-Var Stats

with L1 only, find

$\mu = \bar{x} = 6$

$\sigma = \sigma_{\bar{x}} = 2.236$

$\sigma^2 = 5$

Take all Samples with Size 2 with replacement

Find $\bar{x}$ of each Sample

3,3	3,5	3,7	3,9	3 4 5 6
5,3	5,5	5,7	5,9	4 5 6 7
7,3	7,5	7,7	7,9	5 6 7 8
9,3	9,5	9,7	9,9	6 7 8 9

Nov 4-9:15 AM

3	4	5	6
4	5	6	7
5	6	7	8
6	7	8	9

16 Means

$\bar{x}$	$P(\bar{x})$
3	1/16
4	2/16
5	3/16
6	4/16
7	3/16
8	2/16
9	1/16

$\bar{x} \rightarrow$ L2

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

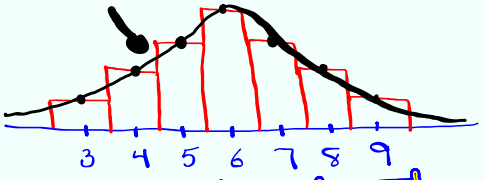
Use 1-Var Stats with L2 & L3

$\mu = 6$

$\sigma = 1.581$

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

Bell-shape



Central-Limit Theorem

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

Nov 4-9:20 AM

Consider a normal Prob. dist with $\mu = 80$ and $\sigma = 10$.

If we randomly select [4 items], find

$\mu_{\bar{x}} = \mu = 80$

$\sigma_{\bar{x}}^2 = \frac{\sigma^2}{n} = \frac{10^2}{4} = \frac{100}{4} = 25$

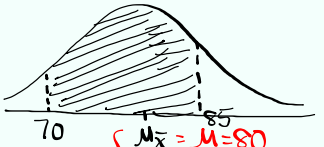
$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{10}{\sqrt{4}} = \frac{10}{2} = 5$

Find the prob. that [their means] is between 70 and 85.

$P(70 < \bar{x} < 85)$

= normalcdf(70, 85, 80, 5)

= [.819] ≈ 82%



CLT $\begin{cases} \mu_{\bar{x}} = \mu = 80 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{10}{\sqrt{4}} = 5 \end{cases}$

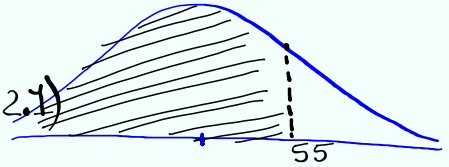
Nov 4-9:28 AM

Ages of teachers are N.D. with mean of 52.5 yrs and standard dev. of 4.2 yrs.

If we randomly select $n=4$ 4 teachers, find the Prob. that $\bar{x}$ their mean age is below 55 yrs.

$P(\bar{x} < 55)$

=normalcdf(-E99, 55, 52.5, 2.1)



$\approx$ .883 $\approx 88\%$

CLT $\begin{cases} \mu_{\bar{x}} = \mu = 52.5 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{4.2}{\sqrt{4}} = \frac{4.2}{2} = 2.1 \end{cases}$

Nov 4-9:35 AM

for randomly selected groups of 5 teachers, find the mean age that separates the top 10% from the rest.

Keep 1-decimal.

$\bar{x}$ = invNorm(.9, 52.5, 4.2/$\sqrt{5}$)

CLT $\begin{cases} \mu_{\bar{x}} = \mu = 52.5 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{4.2}{\sqrt{5}} \end{cases}$

$\approx$ 54.9

Nov 4-9:41 AM

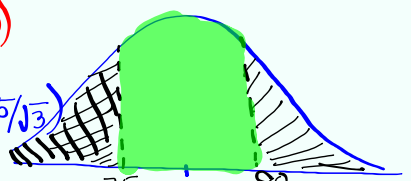
Speed of Cars on certain FWY during certain time are normally dist. with $\mu = 78$ and $\sigma = 5$.

If we randomly select 3 Cars ($n = 3$), $\bar{x}$ find the prob. that their mean speed is below 75 or above 80.

$P(\bar{x} < 75 \text{ or } \bar{x} > 80)$

$= 1 - \text{normalcdf}(75, 80, 78, 5/\sqrt{3})$

$= .394$



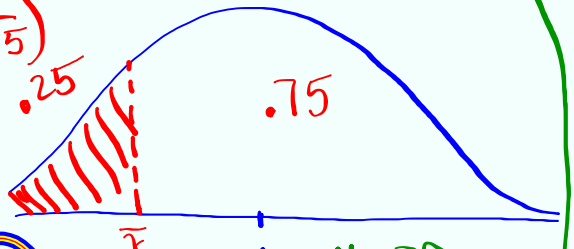
CLT $\begin{cases} \mu_{\bar{x}} = \mu = 78 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{5}{\sqrt{3}} \end{cases}$

Nov 4-9:46 AM

Find $\bar{x} = Q1$, Round to whole #, for randomly selected group of 5 Cars

$\bar{x} = \text{invNorm}(.25, 78, 5/\sqrt{5})$

≈ 76 mph



CLT $\begin{cases} \mu_{\bar{x}} = \mu = 78 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{5}{\sqrt{5}} \end{cases}$

SG 18, 19, 20, and 21. ✓

Nov 4-9:53 AM