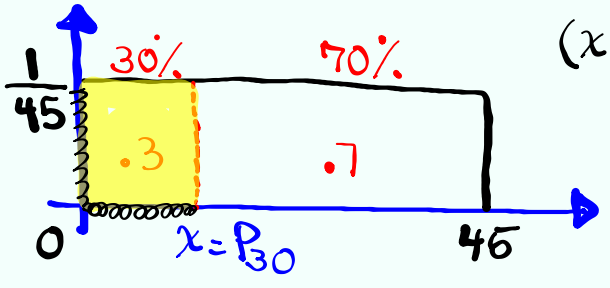
# Statistics

# Lecture 19

Feb 19-8:47 AM

Consider a uniform Prob. dist. for all values from 0 to 45. Find $x = P_{30}$.




$(x-0)\cdot\frac{1}{45} = .3$

$x = 45(.3)$

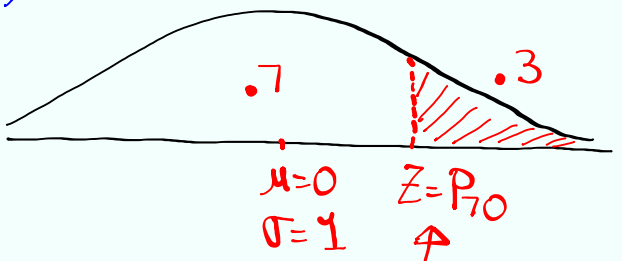
$\boxed{x = 13.5}$

May 6-9:57 AM

Find $z = P_{70}$, round to 3-dec.

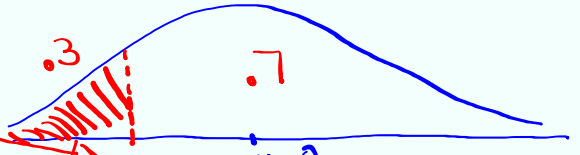
$z = \text{invNorm}(.7, 0, 1)$

$\approx \boxed{.524}$




Find $z = P_{30}$

By Symmetry




$z = \text{invNorm}(.3, 0, 1) =$

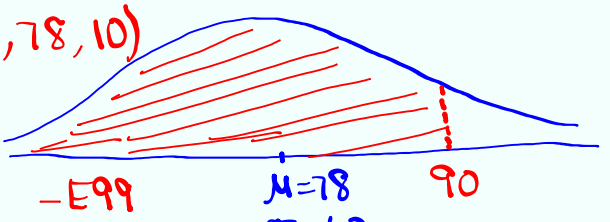
May 6-10:02 AM

Given $N(78, 10)$ Normal Prob. dist. $\mu = 78$, $\sigma = 10$

Find $P(x < 90)$

$= \text{normalcdf}(-E99, 90, 78, 10)$

$= \boxed{.885} = 88.5\%$

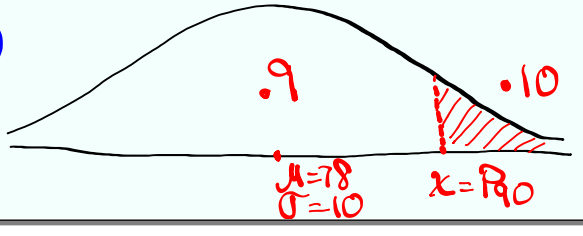



Find $x = P_{90}$, round to whole #

$x = \text{invNorm}(.9, 78, 10)$

$= 90.816$

$\approx \boxed{91}$




May 6-10:07 AM

Clear all lists.

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

Use 1-Var Stats with L1 only to find

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

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

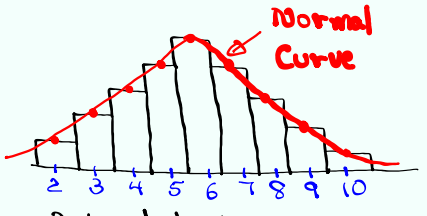
| | | | | |
|---|---|---|---|---|
| 2,2 | 2,4 | 2,6 | 2,8 | 2,10 |
| 4,2 | 4,4 | 4,6 | 4,8 | 4,10 |
| 6,2 | 6,4 | 6,6 | 6,8 | 6,10 |
| 8,2 | 8,4 | 8,6 | 8,8 | 8,10 |
| 10,2 | 10,4 | 10,6 | 10,8 | 10,10 |

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 |

May 6-10:15 AM

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




Prob. dist. histogram

$\bar{x} \rightarrow$ L2, $P(\bar{x}) \rightarrow$ L3 use 1-Var Stats with L2 & L3.

$\mu_{\bar{x}} = 6$ $\quad \sigma_{\bar{x}} = 2$ $\quad \sigma_{\bar{x}}^2 = 4 = \frac{8}{2}$

**Central Limit Theorem**

CLT

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

May 6-10:24 AM

Given $N(80, 10)$

Suppose we take all Samples of Size 4 $n=4$

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

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

Suppose Salaries of nurses are normally dist. with mean of \$6500/mo. and Standard deviation of \$300/mo. $N(6500, 300)$

If we randomly Select all Samples of Size 9, find

$\mu_{\bar{x}} = \mu = 6500$ CLT

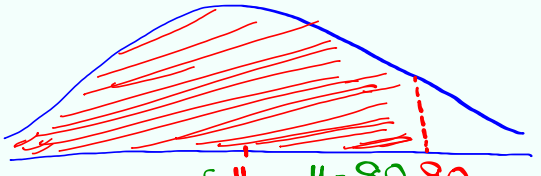
$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{300}{\sqrt{9}} = 100$ CLT

May 6-10:36 AM

Exam 2 Scores are normally dist. with the mean of 80 and Standard deviation of 12. $N(80, 12)$

If we randomly Select 4 exams, $n=4$ find the prob. that their mean Score $\bar{x}$ is below 90.

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



= normalcdf(-E99, 90, 80, 6) CLT $\mu_{\bar{x}} = \mu = 80$ 90

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{12}{\sqrt{4}} = 6$

= .952

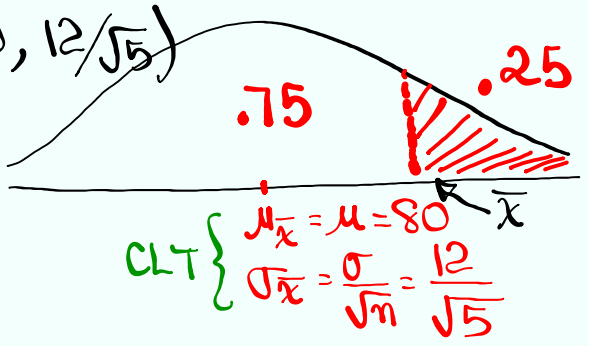
May 6-10:43 AM

Find $\bar{x} = Q_3$ for randomly Selected 5 exams. Round to whole #.

$\bar{x} = \text{invNorm}(.75, 80, 12/\sqrt{5})$

$= 83.620$

$\approx \boxed{84}$




CLT $\begin{cases} \mu_{\bar{x}} = \mu = 80 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{12}{\sqrt{5}} \end{cases}$

May 6-10:51 AM

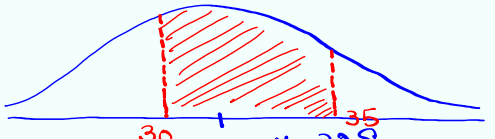
Ages of all college students are normally dist. with mean of 30.8 yrs and standard dev. of 7.5 yrs. $N(30.8, 7.5)$

If we randomly select $n=10$ 10 students, find the prob. that $\bar{x}$ their mean age is between 30 and 35 yrs.

$P(30 < \bar{x} < 35)$

$= \text{normalcdf}(30, 35, 30.8, 7.5/\sqrt{10})$

$\approx \boxed{.594}$




CLT $\begin{cases} \mu_{\bar{x}} = \mu = 30.8 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{7.5}{\sqrt{10}} \end{cases}$

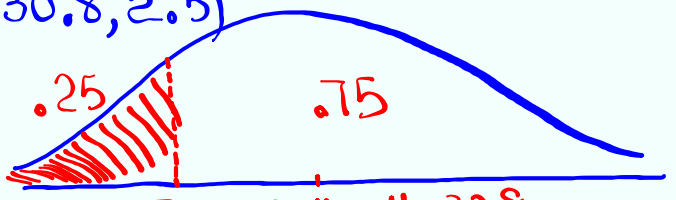
May 6-10:59 AM

Find $\bar{x} = Q_1$ for randomly selected 9 students. Round to 1-dec.

$\bar{x}$ = invNorm(.25, 30.8, 2.5)

= 29.114

$\approx \boxed{29.1}$




CLT $\begin{cases} \mu_{\bar{x}} = \mu = 30.8 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{7.5}{\sqrt{9}} = 2.5 \end{cases}$

SG 17 – 20 ✓

May 6-11:07 AM