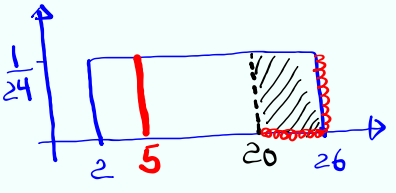
Statistics

Lecture 18

Feb 19-8:47 AM

Consider a uniform Prob. Dist. for all values from 2 to 26.

1) Draw & clearly label.



2) $P(x=5) = 0$

3) $P(x>20)$

$= (26-20)\cdot\frac{1}{24}$

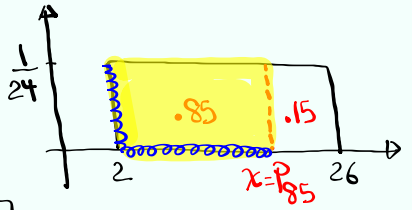
$= \frac{6}{24} = \boxed{\frac{1}{4}} = \boxed{.25}$

4) $x = P_{85}$, Round to 1-dec.

$(x-2)\cdot\frac{1}{24} = .85$

$x-2 = 24(.85)$

$x = 2+24(.85) = \boxed{22.4}$

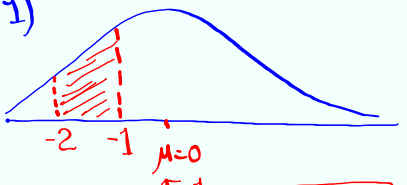


Nov 5-10:38 AM

Find $P(-2 < Z < -1)$

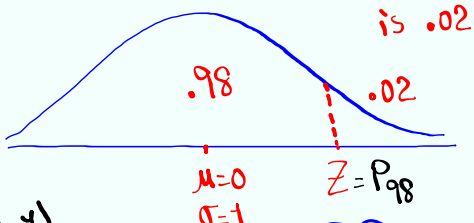
=normalcdf(-2, -1, 0, 1)

= .136



Find a Z-value that separates the top 2% from the rest. Round to 3-dec. places. Right Area is .02

1 - .02 = .98



Z = invNorm(.98, 0, 1)

= 2.054

SC17

Nov 5-10:45 AM

Given N(44, 8)

Normal Prob. Dist. μ σ

Find $P(x < 50)$

=normalcdf(-E99, 50, 44, 8)

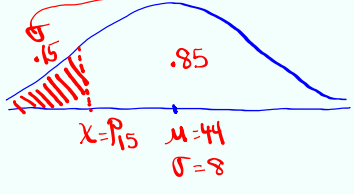
= .773

Find a value that separates the bottom 15% from the rest. Round to whole #

x = invNorm(.15, 44, 8)

= 35.709

≈ 36



Nov 5-10:53 AM

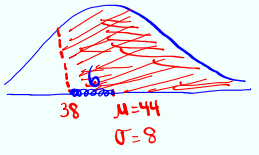
Ages of nurses in LA county has a normal dist. with mean of 44 yrs and standard dev. of 8 yrs. $N(44, 8)$

If we randomly select one nurse, find the prob. that his/her age (x) is more than 38 yrs.

$P(x > 38)$

= normalcdf(38, E99, 44, 8)

= .773

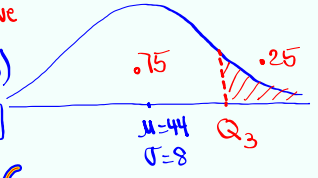


Find Q_3 of the ages of these nurses. Round to whole #

75% below
25% above

Q_3 = invNorm(.75, 44, 8)

= 49.396 ≈ 49



SG 18 ✓

Nov 5-11:02 AM

Clear all lists

Store 2, 4, and 6 in L1.

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

$\mu = \bar{x} = 4$ $\quad \sigma = \sigma_x = 1.633$ $\quad \sigma^2 = \sigma_x^2 = 2.6\overline{6} = \frac{8}{3}$

Take all Samples of Size 2 with replacement from 2, 4, and 6.

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

} 9 Samples of Size 2

Nov 5-11:13 AM

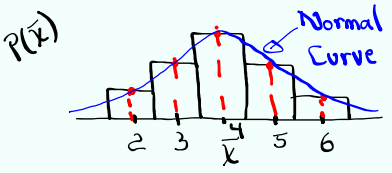
Find $\bar{x}$ of each Sample:

2	3	4
3	4	5
4	5	6

9 Means

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

Draw Prob. dist. Histogram



$\bar{x} \rightarrow$ L2

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

Use 1-Var Stats with L2 & L3 to find

$\mu_{\bar{x}} = 4$ $\quad \sigma_{\bar{x}} = 1.155$ $\quad \sigma^2_{\bar{x}} = 1.\overline{3} = \frac{4}{3} = \frac{8}{3}$ 2

CLT (Central Limit Theorem)

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

Nov 5-11:18 AM

Given $N(85, 12)$ $\quad n=4$

for randomly selected group of 4.

$\mu_{\bar{x}} = \mu = 85$ $\quad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{12}{\sqrt{4}} = 6$

CLT $\quad$ CLT

what if we randomly select group of 9.

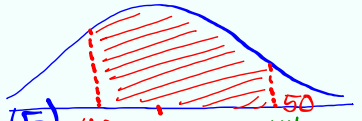
$\mu_{\bar{x}} = \mu = 85$ $\quad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{12}{\sqrt{9}} = 4$

Nov 5-11:29 AM

Ages of nurses in LA County has a normal dist. with mean of 44 yrs and Standard dev. of 8 yrs. $N(44, 8)$

If we randomly select $n=3$ 3 nurses find the Prob. that $\bar{x}$ their mean age will be between 40 & 50.

$P(40 < \bar{x} < 50)$



$= \text{normalcdf}(40, 50, 44, 8/\sqrt{3})$

$.7097$

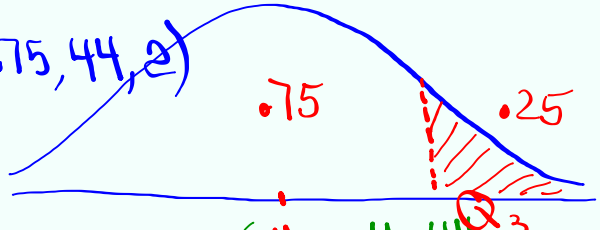
$= .710$ $\approx 71\%$

CLT $\begin{cases} \mu_{\bar{x}} = \mu = 44 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{8}{\sqrt{3}} \end{cases}$

Nov 5-11:33 AM

Find $\bar{x} = Q_3$, Round to whole number, for randomly selected group of 16 nurses.

$\bar{x} = Q_3 = \text{invNorm}(.75, 44, 2)$



$= 45.349$

≈ 45

SG 19 ✓

CLT $\begin{cases} \mu_{\bar{x}} = \mu = 44 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{8}{\sqrt{16}} = 2 \end{cases}$

Nov 5-11:42 AM

SAT Scores are normally dist. with $\mu = 1250$ and $\sigma = 100$.

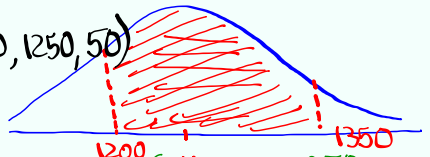
If we randomly select $n = 4$ SAT exams,

find the prob. that their mean score $\bar{x}$ is between 1200 & 1350.

$P(1200 < \bar{x} < 1350)$

= normalcdf(1200, 1350, 1250, 50)

= .819



CLT $\begin{cases} \mu_{\bar{x}} = \mu = 1250 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{100}{\sqrt{4}} = 50 \end{cases}$

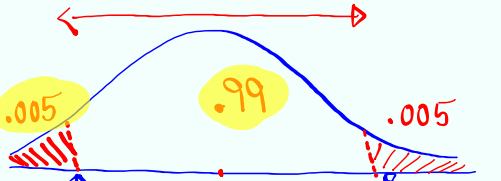
Nov 5-11:48 AM

Find two means rounded to whole #, that separate the middle 99% from the rest for randomly selected group of 25 SAT.

$1 - .99 = .01$

$.01 \div 2 = .005$

SG 20



CLT $\begin{cases} \mu_{\bar{x}} = \mu = 1250 \\ \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{100}{\sqrt{25}} = 20 \end{cases}$

$\bar{x}_1$ $\bar{x}_2$

$\bar{x}_1 = \text{invNorm}(.005, 1250, 20) \approx 1198$

$\bar{x}_2 = \text{invNorm}(.995, 1250, 20) \approx 1302$

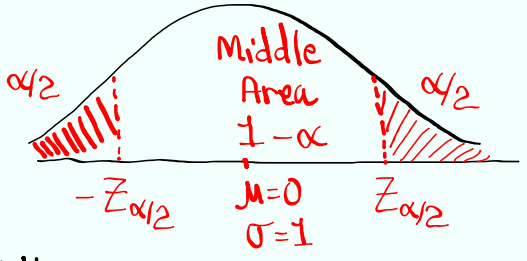
Nov 5-11:54 AM

Critical Value z_α

Alpha — Significance level

$0 < \alpha < 1$

$z_{\alpha/2}$ → Area on the right tail



$1-\alpha$ Middle Area

$(1-\alpha)\cdot 100\%$ Confidence level

Nov 5-12:04 PM

Find $z_{.01}$ → Right Area

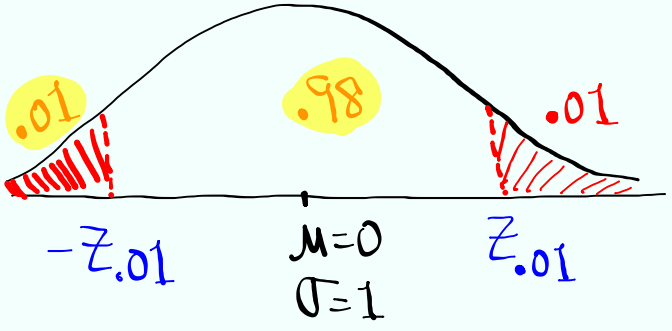
$\frac{\alpha}{2} = .01$

Significance level

$\alpha = .02$

$1-\alpha = .98$ → Middle Area

98% Confidence level



$z_{.01} = \text{invNorm}(.99, 0, 1) = 2.326$

Nov 5-12:09 PM

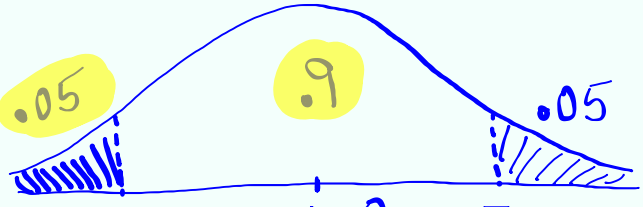
Find $z_{.05}$ → Right Area

Significance level

$\frac{\alpha}{2} = .05 \rightarrow \alpha = .1$

$1 - \alpha = .9$ Middle Area

90% Confidence level



$-z_{.05}$ $z_{.05}$

-1.645 1.645

$z_{.05} = \text{invNorm}(.95, 0, 1) =$ **1.645**

Nov 5-12:15 PM

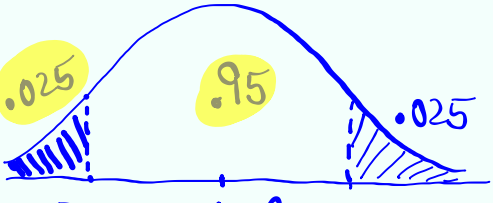
Find $\pm z_{\alpha/2}$ for 95% Conf. level.

Middle Area .95

$1 - \alpha = .95$

$\alpha = .05$

$\alpha/2 = .025$ Area of each tail.



$-z_{\alpha/2}$ $z_{\alpha/2}$

-1.960 1.960

$z_{\alpha/2} = \text{invNorm}(.975, 0, 1) =$ **1.960**

Nov 5-12:33 PM