Statistics

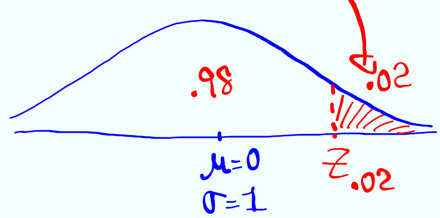
Lecture 18

Feb 19-8:47 AM

find $z_{.02}$

$= \text{invNorm}(.98, 0, 1)$

$\approx \boxed{2.054}$



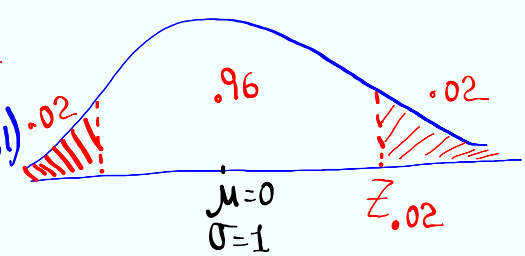
find $z_{\alpha/2}$ for $\underbrace{96\%\ \text{C-level}}_{\text{Middle Area} = .96}$.

$1 - .96 = .04 \leftarrow \alpha$

$.04/2 = .02 \leftarrow \alpha/2$

$z_{.02} = \text{invNorm}(.98, 0, 1)$

$\approx \boxed{2.054}$



Apr 20-6:53 PM

In a Survey of 178 Voters, 32% of them were in Support of the conflict in the middle east.

$n=178$

$\hat{p}=.32$

$\rightarrow x = n\hat{p} = 178(.32) = 56.96$ $\rightarrow$ $\boxed{x=57}$

if decimal $\rightarrow$ Round-up

Find $\boxed{99\% \text{ Conf. interval}}$ for the proportion of all voters in Support of the conflict in the middle east.

C-level: .99

1-PropZInt

$x=57$

$n=178$

C-level: .99

$\boxed{.23 < p < .41}$

$$E = \frac{.41 - .23}{2} = \boxed{.09}$$

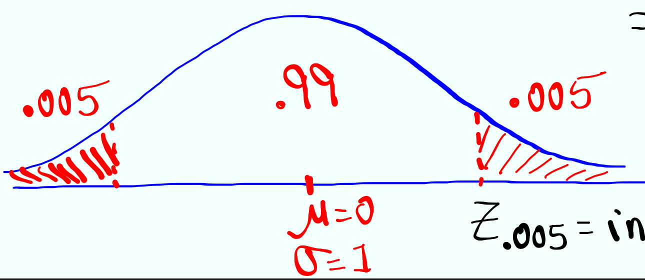
Apr 20-6:59 PM

$\boxed{\text{How many voters}}$ (n) should we randomly Select if we wish to keep Same Conf. level but error not to exceed 4%?

$$n = \hat{p}\hat{q}\left(\frac{Z_{\alpha/2}}{E}\right)^2 = (.32)(.68)\left(\frac{2.576}{.04}\right)^2$$

$= 902.465....$

$\boxed{n=903}$



$Z_{.005} = \text{invNorm}(.995, 0, 1)$

Apr 20-7:08 PM

40 randomly Selected doctors had a mean age of 48.5 yrs. $n=40$ $\bar{x}=48.5$ $\sigma=9.75$

It is known that standard deviation of ages of all doctors is 9.75 yrs.

NO C-level → .95

Find Conf. interval for the mean age of all doctors.

$\boxed{45.5 < \mu < 51.5}$

σ known → Z Interval

inpt: Stats

$\sigma = 9.75$

$\bar{x} = 48.5$ ← Round to 1-dec.

$n = 40$

C-level: .95

Calculate

$E = \frac{51.5 - 45.5}{2} = \boxed{3}$

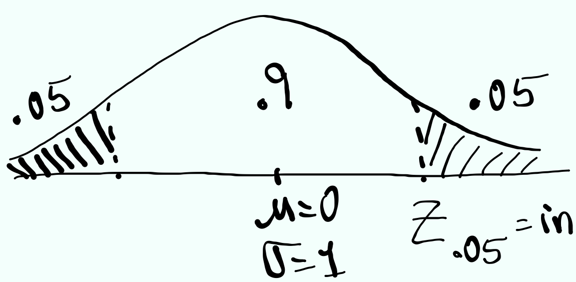
$\bar{x} = \frac{51.5 + 45.5}{2} = \boxed{48.5}$

Apr 20-7:14 PM

How many doctors (n) should be randomly Select if we wish to 90% Confident and error to be within 5 yrs?

$$n = \left(\frac{Z_{\alpha/2} \cdot \sigma}{E}\right)^2 = \left(\frac{1.645 \cdot 9.75}{5}\right)^2 = 10.28\ldots$$

$\boxed{n = 11}$



$Z_{.05} = \text{invNorm}(.95, 0, 1)$

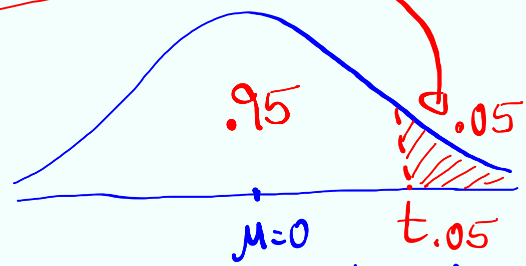
Apr 20-7:22 PM

Find $t_{\alpha/2}$ for $\alpha = .1$ with $df = 19$.

$\alpha/2 = .05$

$t_{.05} = \text{invT}(.95, 19)$

$\approx \boxed{1.729}$



σ unknown

$df = 19$

Apr 20-7:27 PM

10 randomly selected 1B1B apt. in LA had a mean rent of \$1800/mo. with standard dev. of \$475.

$n = 10$
$\bar{x} = 1800$
$S = 475$

C-level: .99

Find 99% conf. interval for the mean rent of all 1B1B apt. in LA.

σ unknown $\rightarrow$ TInterval

inpt: $\boxed{\text{Stats}}$

$E = \dfrac{2288 - 1312}{2}$

$= \boxed{488}$

Since $\bar{x}$ is a whole #

$\rightarrow$ Round to whole #

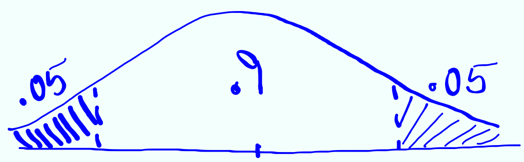
$\boxed{1312 < \mu < 2288}$

Apr 20-7:30 PM

How many 1B1B apt. in LA should we randomly select to be 90% conf. & error not exceed \$100?

$$n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E}\right)^2 = \left(\frac{1.645 \cdot 475}{100}\right)^2 = 61.05\ldots \rightarrow \boxed{n = 62}$$

Since σ is unknown → we use S.



$\mu = 0$
$\sigma = 1$

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

Apr 20-7:36 PM

I randomly selected 20 voters. Here are their ages:

32	48	25	50	70
30	42	49	62	65
28	45	38	65	75
29	24	42	58	58

Find

1) $\bar{x} \approx 47$
2) $S \approx 16$

} Round To whole

3) $S^2 = \frac{19151}{76}$ } Fraction

No C-level → .95

4) Find Conf. interval for the mean age of all voters.

$\boxed{40 < \mu < 54}$

σ Known → Z Interval

$\boxed{\sigma \text{ Unknown} \rightarrow \text{T Interval}}$

$E = \frac{54 - 40}{2} = \boxed{7}$

SG 21 & 22 ✓

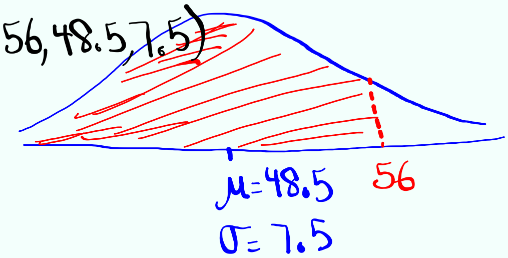
Apr 20-7:41 PM

Ages of doctors are normally dist. with mean of 48.5 yrs and standard dev. of 7.5 yrs.

If we randomly select $\boxed{\text{one doctor}}^{n=1}$, find the prob. that $\underbrace{\boxed{\text{his/her age}}}_{x}$ is below 56 yrs.

$P(x<56)$

$=\text{normalcdf}(-E99, 56, 48.5, 7.5)$



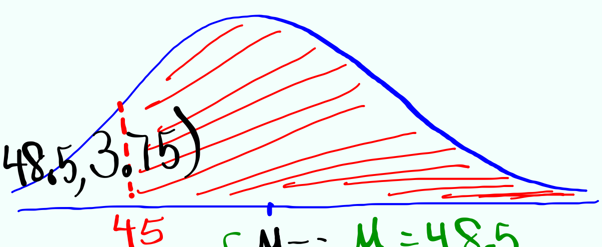
$= \boxed{.841}$

Apr 20-7:51 PM

If we randomly select $\boxed{\text{4 doctors,}}^{n=4}$ find the prob. that $\overset{\bar{x}}{\boxed{\text{their mean age}}}$ is above 45 yrs.

$P(\bar{x}>45)$

$=\text{normalcdf}(45, E99, 48.5, 3.75)$



CLT $\begin{cases} \mu_{\bar{x}} = \mu = 48.5 \\ \sigma_{\bar{x}} = \dfrac{\sigma}{\sqrt{n}} = \dfrac{7.5}{\sqrt{4}} = 3.75 \end{cases}$

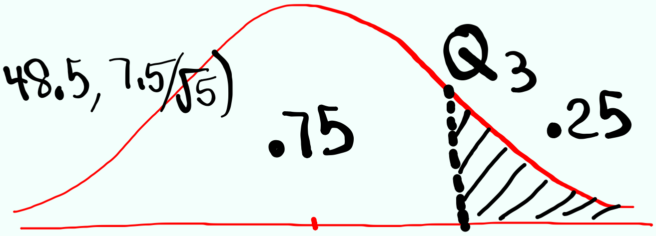
$= \boxed{.825}$

Apr 20-7:57 PM

Find $\bar{x} = Q_3$ for randomly selected groups of 5.

$\bar{x} = \text{invNorm}(.75, 48.5, 7.5/\sqrt{5})$

$= \boxed{50.8}$

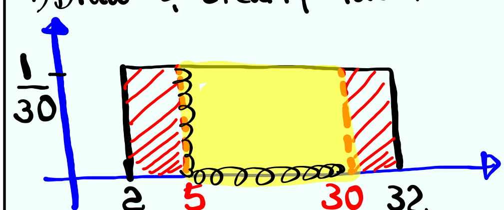


CLT $\begin{cases} \mu_{\bar{x}} = \mu = 48.5 \\ \sigma_{\bar{x}} = \dfrac{\sigma}{\sqrt{n}} = \dfrac{7.5}{\sqrt{5}} \end{cases}$

Apr 20-8:01 PM

Consider a uniform Prob. dist. for all values from 2 to 32.

1) Draw & clearly label.



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

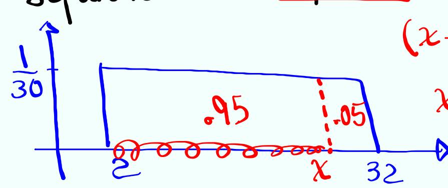
3) $P(x<5 \text{ or } x>30)$

$= 1 - P(5<x<30)$

$= 1 - (30-5)\cdot\frac{1}{30}$

$= 1 - \frac{25}{30} = \frac{5}{30} = \boxed{\frac{1}{6}}$

4) Find a value that separates the $\boxed{\text{top } 5\%}$ from the rest.



$(x-2)\cdot\frac{1}{30} = .95$

$x - 2 = 30(.95)$

$x = 2 + 30(.95) \approx \boxed{30.5}$

Apr 20-8:07 PM

I tossed a fair coin 1600 times. Success is to land tails.

$n = 1600$
$p = .5$
$q = .5$

1) $\mu = np = \boxed{800}$

2) $\sigma^2 = npq = \boxed{400}$

3) $\sigma = \sqrt{\sigma^2} = \boxed{20}$

4) Usual Range $\mu \pm 2\sigma = 800 \pm 2(20)$

95% $\rightarrow$ $= 800 \pm 40$

$= \boxed{760 \text{ to } 840}$

5) P(# of tails is between 760 & 840, inclusive)

$P(760 \leq x \leq 840)$

759 760 840

$= P(x \leq 840) - P(x \leq 759)$

$=$ binomcdf(1600, .5, 840) − binomcdf(1600, .5, 759)

$\approx \boxed{.957} \approx 95.7\%$

Apr 20-8:15 PM

Consider the chart below:

x	y
4	10
5	12
5	15
8	20
10	25

Find

1) $a = 1.\overline{1}$ $\rightarrow$ $\boxed{y \approx 1 + 2x}$

2) $b = 2.3\overline{8}$

3) $r^2 = .964 \approx 96\%$

4) $r = .982$

Predict y if $x = 6$

a) Assume r is significant

$y = 1 + 2x = 1 + 2(6) = \boxed{13}$

b) Assume r is not significant.

$y \rightarrow \bar{y} = 16.4 \approx \boxed{16}$

Apr 20-8:24 PM