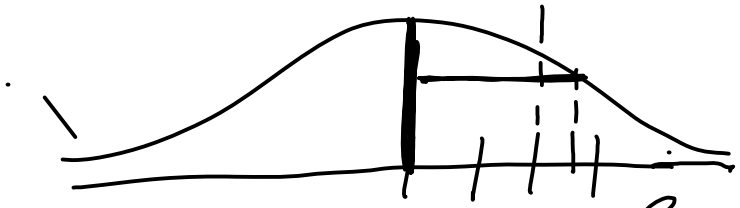
STT200 1-23-09a

TODAY:

NORMAL POPULATION



MEAN = 102

$\sigma \sim 2.5$

$\mu_{ALCOHOL}$ = SMOKES OF ONE

μ = Pop AVG ALCOHOL PER DIP

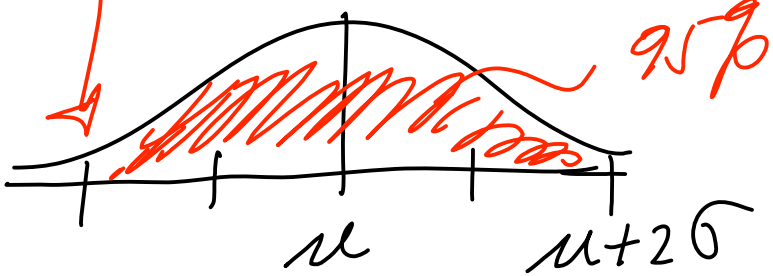
= $\mu_{ALCOHOL}$ IN VAT.

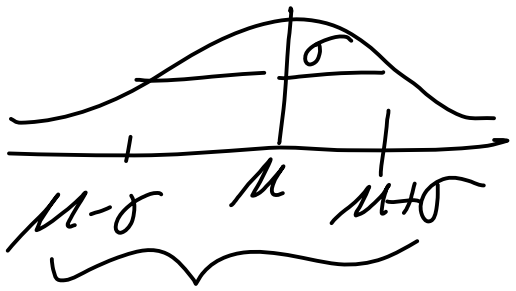
102 → 104

MEAN STEEPEST

$\mu - 2\sigma$

95%





t-TABLE $df = n-1$

$31 = 2$ ←

∞	1.96
CONF	95%

SO IF POP IS NORMAL

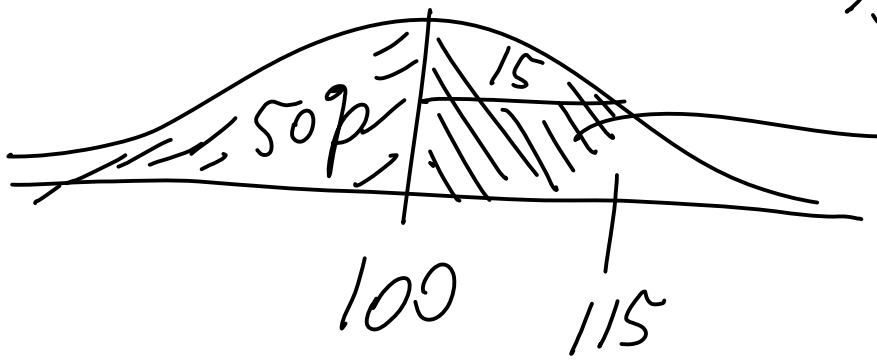
$$P\left(\mu \text{ IS COVERED BY } \left[\bar{x} \pm 4.303 \frac{\sigma}{\sqrt{n}}\right]\right) = .95$$

EXAMPLE IQ $\approx$ NORMAL $\mu = 100$

$\sigma = 15$

PERSON W/ IQ = 115

HAS STD SCORE $\frac{115-100}{15} = 1$ (Z-SCORE)



THIS PERSONS' IQ SURPASSES .5 + .34 = .84 OF POPULATION

(THEY ARE AT 84TH PERCENTILE OF IQ)

"LOTS OF POPULATIONS ARE ~ NORMAL"

STUDENTS' t METHOD OF OBTAINING CI FOR

BP MEAN μ FOR EVERY $n > 1$

PROVIDED THE POPULATION FOLLOWS

A NORMAL DISTRIBUTION

[RECALL 1-14-09 (FOR $n \to \infty$) CI $\bar{X} \pm 1.96 \frac{\sigma}{\sqrt{n}} \sqrt{\frac{N-n}{N-1}}$ P(SAME COVERS μ) $= .95 + O(\frac{1}{n})$]

STUDENTS' t COUNTERPART (VALID FOR SAMPLING A NORMAL POPULATION)

NORMAL Pop^{N} $N \sim \infty$ (SMOOTH) SO $\sqrt{\frac{N-n}{N-1}} \sim 1$ ✓

HERE IT IS: $\bar{x} \pm$ [redacted] $\frac{\sigma}{\sqrt{n}}$ all $n > 1$

↑ t-TABLE

t-TABLE GIVES PERCENTAGE POINTS OF $\frac{\bar{x}-\mu}{\sigma/\sqrt{n}}$

JUST TABLE FOR $\mu = 0$, $\sigma = 1$

$\left|\frac{\bar{x}-\mu}{\sigma/\sqrt{n}}\right| < \text{const}$

$= \mu$ IN $\bar{x} \pm \text{const} \frac{\sigma}{\sqrt{n}}$

IN σ ARE $x_i - \bar{x}$

μ IS ABSENT

t-TABLE

DF $n-1$

[redacted]

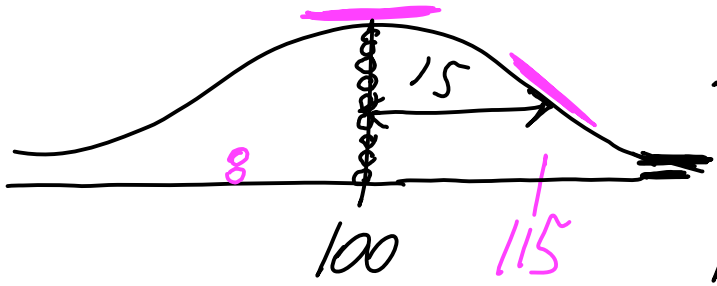
∞ | 1.96

CONF | 95%

STT 200 1-23-09b

TODAY: NORMAL POPULATION, CI FOR μ WHEN SAMPLING A NORMAL POPULATION.

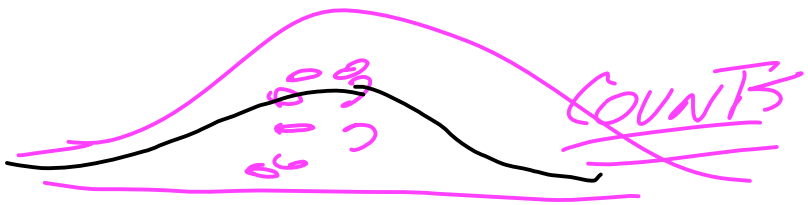
IQ. POP^N DIST^N



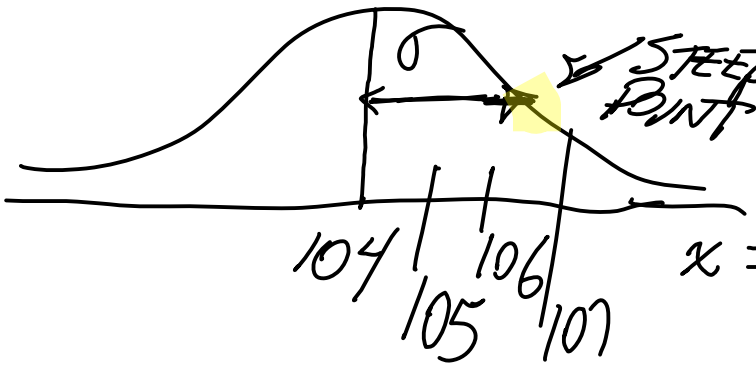
$\mu = 100$

$\sigma = 15$

POPULATION



EXAMPLE



$\mu = 104$

$\sigma = 106.5 - 104 = 2.5$

x = BLOOD PRESSURE READING

ENTER GOSSETT —

LOTS OF POPULATIONS ARE ~ NORMAL. ((N ~ ∞))

ANALOGUE OF CI FOR μ

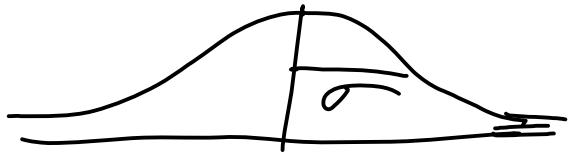
RECALL 1-14-09 CI $\bar{x} \pm 1.96 \frac{\sigma}{\sqrt{n}} \sqrt{\frac{N-n}{N-1}}$ for 95% conf

CLAIM: $P(\mu \text{ COVERED BY } \underbrace{\bar{x} \pm 1.96 \frac{\sigma}{\sqrt{n}}}_{\text{RANDOM}}) = .95 + O(\frac{1}{n})$ order

↑ CLOSES ON .95

"STUDENT"

$x_1\ x_2\ x_3 \ldots$

IF POP^N IS NORMAL $\text{Pop}^N \approx$ 

WE CAN GIVE CI $\bar{x} \pm \cancel{1.96}\ t \frac{\sigma}{\sqrt{n}} \sqrt{\frac{N-n}{N-1}}$ μ AVG ALCOHOL IN DIP

LOOKIE! $P(\mu \text{ IS IN } \bar{x} \pm 4.303\ \sigma/\sqrt{3}) = .95$

IN GENERAL, FOR EVERY $n > 1$

CLAIM IF Pop IS NORMAL

$P(\mu \text{ IS COVERED BY } \bar{x} \pm t\frac{s}{\sqrt{n}}) =$

n	t	Conf
$n=5, DF=4$	4.604	99%

$\Longrightarrow$ 99% CI for μ (NORMAL Pop)

$\bar{x} \pm 4.604\, s/\sqrt{n}$

$\left|\frac{\bar{x}-\mu}{\sigma/\sqrt{n}}\right| < \text{CONST} \equiv \mu \text{ IN } \bar{x} \pm \text{CONST}\, \sigma/\sqrt{n}$

HAS LOST μ, σ

t TABLE WORKS THIS OUT FOR $\mu=0, \sigma=1$