1. A random sample of 400 hospital admissions from a week's total of 5400 finds 88 were emergency contacts. Give a 98% confidence interval for p = rate of emergency contacts among admissions.

$N = 5400$

$n = 400$

$\hat{p} = \frac{88}{400} = .22$

t-TABLE

$$\hat{p} = \frac{88}{400} = \frac{22}{100} = 0.22$$

DF		
∞	1.96	2.326
Conf	95%	98%

z-BASED CI

98% CI for p

$$\hat{p} \pm z \frac{\sqrt{\hat{p}(1-\hat{p})}}{\sqrt{n}} \sqrt{\frac{N-n}{N-1}}$$

$$.22 \pm 2.326 \boxed{\frac{\sqrt{.22 \cdot .78}}{\sqrt{400}}}$$

$$\cancel{\sqrt{\frac{5400-400}{5400-1}}} \approx 1$$

$$\boxed{\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}}$$

CIRCLE THE EST OF SD OF DIST OF ALL POSS $\hat{p}$

2. A random sample of 36 elk selected from the Jackon, Wy. Elk Refuge in winter are scored for **x** = lead exposure finding

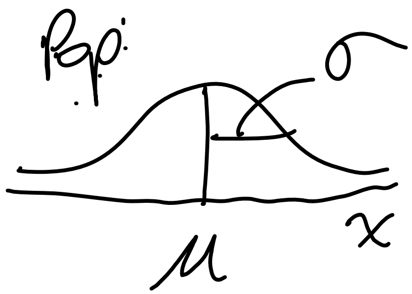
sample mean $\overline{x}$ = 27.6

sample standard deviation s = 11.4

It is believed that x scores in this winter herd are **normal distributed**. Give the 80% confidence interval for population mean lead exposure μ.

DF	
35	1.306
∞	
Conf	80%

$$\overline{x} \pm t \frac{s}{\sqrt{n}} \quad (1)$$



T ENABLES t-BASED CI

$n-1=35$

Conf

$n = 36$ ELK

x_1 = LEAD SCORE ELK 1

x_{36}

$\bar{x} = 27.6$

$s = 11.4$

$27.6 \pm 1.306 \dfrac{11.4}{\sqrt{36}}$

NO FPC IN CASE OF NORMAL

① WHAT DOES $s = 11.4$ ESTIMATE? ANS σ

② WHAT DOES $\dfrac{s}{\sqrt{36}} = \dfrac{11.4}{6}$ ESTIMATE?

ANS. SD OF LIST OF ALL POSSIBLE $\bar{x}$

③ WHAT IS CHANCE AN 80% t CI COVERS μ?

Pop μ, σ ⇒ SAM $\bar{x}, s$

$\bar{x} \sim \mu$ $s \sim \sigma$

3. What does **estimated margin of error of $\overline{x}$** actually estimate?

population sd σ
sd of the list of all possible $\overline{x}$
~~1.96 σ~~
1.96 sd of the list of all possible $\overline{x}$

95% CI $\quad \bar{x} \pm 1.96 \frac{s}{\sqrt{n}} \cancel{(FPC)}$

FATTEN UP

EST OF SD OF ALL POSSIBLE $\bar{x}$

95% CI for $p_L - p_{NL}$ is $\hat{p}_L - \hat{p}_{NL} \pm 1.96\sqrt{\hat{p}_L(1-\hat{p}_L)/n_L + \frac{\hat{p}_{NL}(1-\hat{p}_{NL})}{n_{NL}}}$

LEAVING OUT FPC'S

4. We have obtained **estimated standard errors** for rates of cracking of concrete

0.037 for $\hat{p}_{\text{mixes with latex}}$

0.042 for $\hat{p}_{\text{mixes without latex}}$

Give the **estimated margin of error** for $\hat{p}_{\text{latex}} - \hat{p}_{\text{no latex}}$.

MOE: TALKING 95% CONF

$$1.96\sqrt{0.037^2 + 0.042^2}$$

EST STD ERR OF $\hat{p}_L$ IS $0.037 = \sqrt{\hat{p}_L(1-\hat{p}_L)}/\sqrt{n_L}$

$\hat{p}_{\text{LATEX}} = ?$ $\quad \hat{p}_{\text{NON LATEX}} = ?$

$\frac{\#\text{CRACKED SAMPLES}}{n_L}$

EST'D ERROR OF $\hat{p}_L$ IS 0.037

EST'D STD ERROR OF $\hat{p}_{NL}$ IS 0.042

PYTHAGORAS' FORMULA IS

EST MOE OF $\hat{p}_L - \hat{p}_{NL}$ IS $1.96\sqrt{.037^2 + 0.042^2}$

5. We have obtained **estimated standard errors** for sample means of concrete hardness

0.037 for $\overline{x}_{\text{mixes with latex}}$

0.042 for $\overline{x}_{\text{mixes without latex}}$

Give the **estimated margin of error** for $\overline{x}_{\text{latex}}$-$\overline{x}_{\text{no latex}}$.

$$1.96\sqrt{0.037^2 - 0.042^2}$$

x = CONCRETE HARDNESS

95% CI FOR $\mu_L - \mu_{NL}$

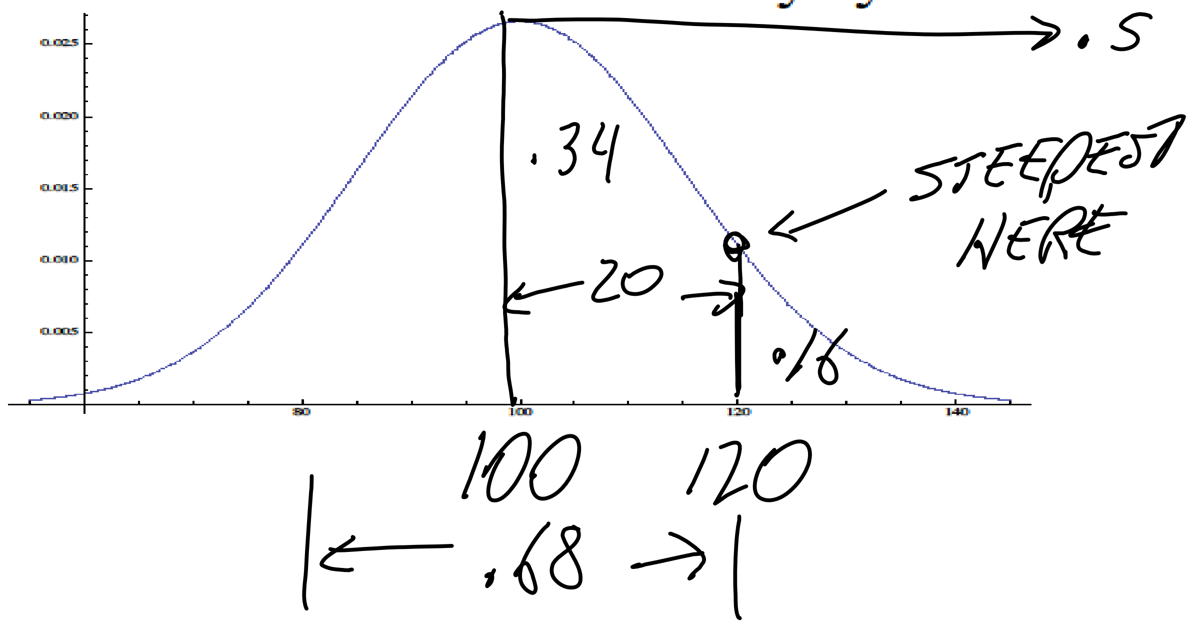
$$= \bar{x}_L - \bar{x}_{NL} \pm 1.96\sqrt{\frac{s_L^2}{n_L} + \frac{s_{NL}^2}{n_{NL}}}$$

$$= \bar{x}_L - \bar{x}_{NL} \pm 1.96\sqrt{0.037^2 + 0.042^2}$$

RECALL EST^D S.E OF $\bar{x}_L$ IS

$\frac{s_L}{\sqrt{n_L}}$ ~~ERR~~ $= 0.037$

6. Estimate the mean and sd by eye.



7. Amount of genetic material in a given plot is normal distributed with

$$\mu = 9 \qquad \sigma = 3$$

Determine the standard score z of a plot with score x = 10.5.

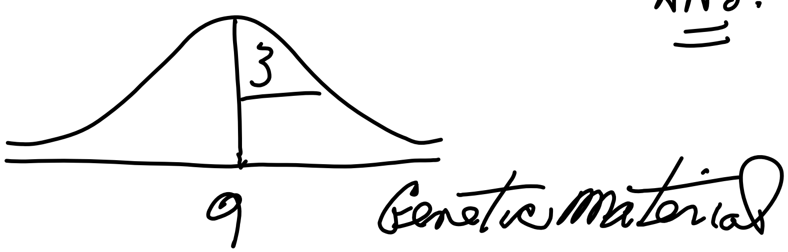
STD SCORE $= z\text{-SCORE} = \dfrac{10.5-9}{3} = \dfrac{1.5}{3} = \dfrac{1}{2}.$

THIS PLOT IS $\frac{1}{2}$ SD FROM MEAN

Determine the amount x of genetic material of a plot with standard score z = 2.5.

ANS. $9 + 2.5(3)$

$= 16.5$



8. What is the **exact chance** that a 95% confidence interval for μ will in fact cover μ if the population is normal distributed and the t-CI is used?

t t t !!

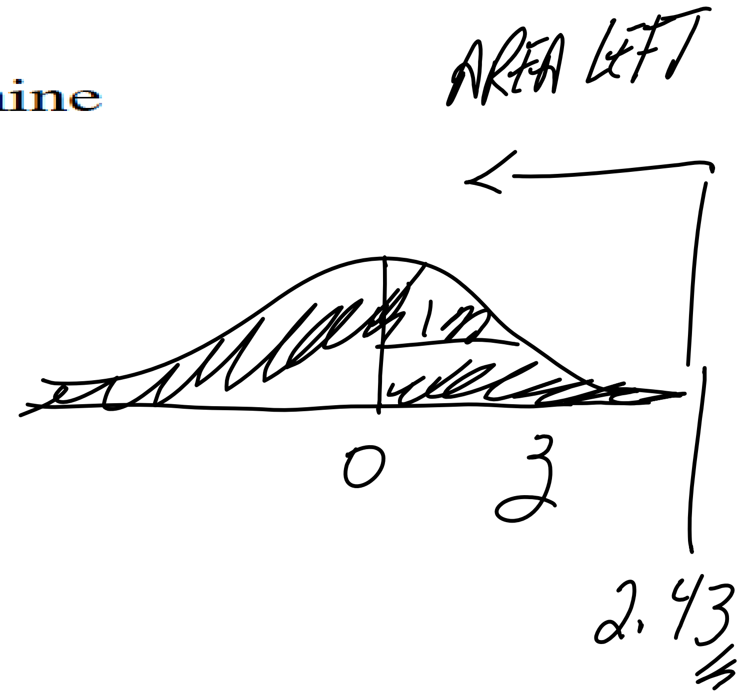
ANS 95%

EXACTLY

9. Use the z-table to determine $P(Z < 2.43)$.

z	0.03
→ 2.4	0.9925

ANS. .9925 of 1.



10. Determine the **86th percentile of Z.**

z	0.08
1.0	0.8599

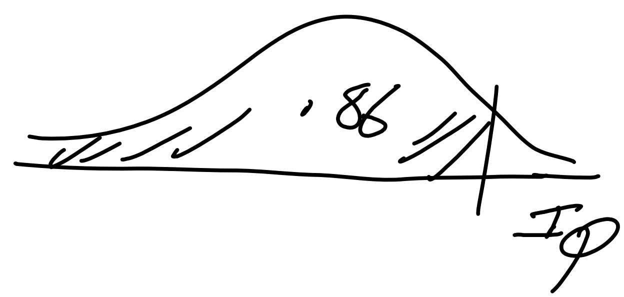
$$\underbrace{0.8599}_{.86}$$

ANS $z = 1.08$

IQ is normal distributed and has mean 100 and sd 15. Determine the **86th percentile of IQ.**

IQ = 100 + z 15

$= 100 + 1.08\,(15)$



11. Determine the 86th percentile of Z.
Calculate the sample standard deviation s for the list x = {0, 0, 4, 8}.

avg = 12/4 = 3

$$s_x = \sqrt{\frac{(0-3)^2+(0-3)^2+(4-3)^2+(8-3)^2}{4-1}} = 3.82971$$

$$s_{4\,x+9} = |\,4\,|\; s_x = 4\,(3.82971)$$

DOES NOT
CHANGE s

12. We've selected random samples of people with or without medication, the score being x = blood pressure decrease over a 5 minute period. Assume large populations.

$\bar{x}_{\text{with med}} = 12.3$ $\quad s_{\text{with med}} = 3.2$ $\quad n = 60$

$\bar{x}_{\text{without med}} = 3.7$ $\quad s_{\text{with med}} = 1.2$ $\quad n = 90$

Give the 95% CI for $\mu_{\text{with med}} - \mu_{\text{without med}}$.

$$(12.3 - 3.7) \pm 1.96 \sqrt{\frac{3.2^2}{60} + \frac{1.2^2}{90}}$$