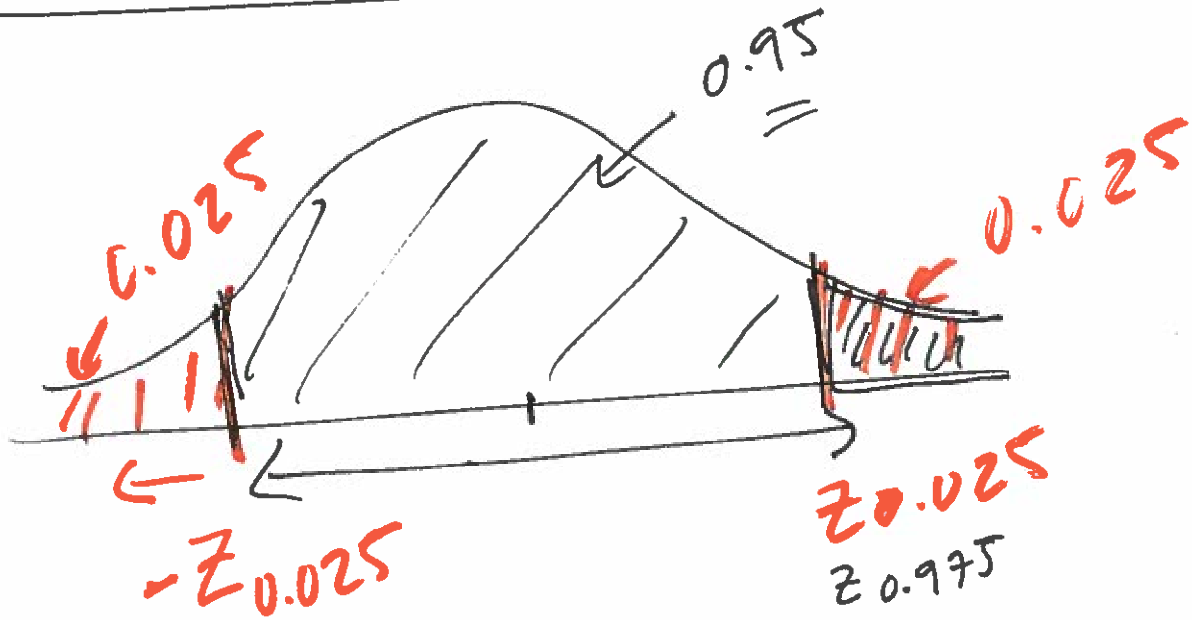
$n = 126$

$\bar{X} = 29.2$ mg/dl

$\sigma = 7.5$ mg/dl

← we are going to build a 95% CI

$\mu = 18.2$ mg/dl ← no exposure



$$P\left(-z_{\alpha/2} < Z < z_{\alpha/2}\right) = 1 - \alpha$$

$$Z = \frac{\bar{X} - \mu_{\bar{x}}}{\sigma/\sqrt{n}} \Rightarrow$$

$$P\left(-z_{\alpha/2} < \frac{\bar{X} - \mu_{\bar{x}}}{\sigma/\sqrt{n}} < z_{\alpha/2}\right) = 1 - \alpha$$

$$P\left(\bar{X} - z_{\alpha/2}\,\sigma/\sqrt{n} < \mu_{\bar{x}} < \bar{X} + z_{\alpha/2}\,\sigma/\sqrt{n}\right)$$

$$= 1 - \alpha$$

STAT 360 Summer

Document Cam / Whiteboard Notes

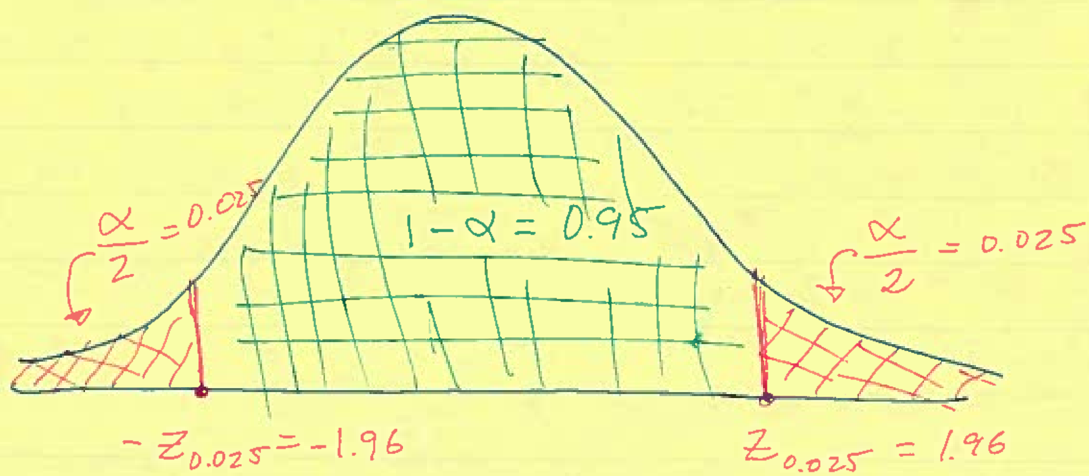
lecture 19/20
p1

Solution to Cairo Policeman Lead

Let's answer this problem by computing a $1-\alpha = .95$ CI around the population mean

$$1-\alpha = 0.95 \Rightarrow \alpha = 0.05 \Rightarrow \frac{\alpha}{2} = 0.025$$

Normally Distributed + σ^2 known $\Rightarrow$ $\boxed{Z\text{-scores}}$



(*) Using table A.5 find z-score for 0.025 and for 0.9725

$$\left[29.2 - 1.96\left(\frac{7.5}{\sqrt{126}}\right),\ 29.2 + 1.96\left(\frac{7.5}{\sqrt{126}}\right)\right]$$

$\Rightarrow [27.89, 30.51] = \text{C.I.}$

$\Rightarrow$ If we perform this experiment 100 times, 95 times the true mean would be inside the above CI.

$\Rightarrow$ Note that it does not contain the average for the unexposed population.

$\Rightarrow$ So the policemen have elevated levels of lead.