DAY 11 – IN CLASS SOLS

1) a) LONGER. FOR 99 OF 100 INTERVALS GENERATED TO CONTAIN μ, THEY WOULD HAVE TO BE WIDER

b) FALSE. CORRECT INTERPRETATION OF A $100\%(1-\alpha)$ CI IS: THAT OF ALL CIS GENERATED, $100\%(1-\alpha)$ OF THEM CONTAIN μ.

c) YES. SEE (b)

---

2) $n=25$ $\bar{X}=4.05$ $s=0.08$ USE t-DIST. $P\left(\frac{\bar{X}-\mu}{s/\sqrt{n}} \le t_\alpha\right)=1-\alpha$

SOLVE FOR μ

$$P(\bar{X}-t_\alpha \tfrac{s}{\sqrt{n}} \le \mu)=1-\alpha$$

$t_{.05}=1.711$

LOWER CONF BOUND $\bar{X}-t_\alpha \frac{s}{\sqrt{n}} = 4.05 - t_{.05}\frac{(.08)}{\sqrt{25}}$

$= 4.022$

CI IS $(4.022, +\infty)$

---

3) $n=20$ $\sigma=2$ $\alpha=.05$ $\bar{X}=$ (CALC PROT) DRUG $= \frac{1}{20}(41.48+39.65+40.46+39.78+33.09)$

$= 9.723$

$\bar{X} \pm z_{\frac{\alpha}{2}}\frac{\sigma}{\sqrt{n}} \rightarrow 9.723 \pm 1.96\frac{(2)}{\sqrt{20}} \rightarrow \begin{matrix}10.599\\8.846\end{matrix}$ $(8.846, 10.599)$

---

4) $n=100$ $p=.52$ $\hat{p} \pm z_{\frac{\alpha}{2}}\sqrt{\frac{\hat{p}\hat{q}}{n}} \rightarrow .52 \pm 1.96\sqrt{\frac{(.52)(.48)}{100}}$

CI WIDTH $\left(\hat{p}-z_{\frac{\alpha}{2}}\sqrt{\ }, \hat{p}+z_{\frac{\alpha}{2}}\sqrt{\ }\right)$ $\rightarrow \begin{matrix}.6179\\.422\end{matrix}$ $(.422, .6179)$

$= 2z_{\frac{\alpha}{2}}\sqrt{\frac{\hat{p}\hat{q}}{n}} = .025 \Rightarrow \frac{2(1.96)}{.025}\sqrt{(.52)(.48)} = \sqrt{n}$

$n = (\ )^2 = 6137$ people

5) $\mu=3$ $n=5$ $\sigma=1$

X_i	X_i^2
1.9	3.61
2.4	5.76
3.0	9
3.5	12.25
4.2	17.64

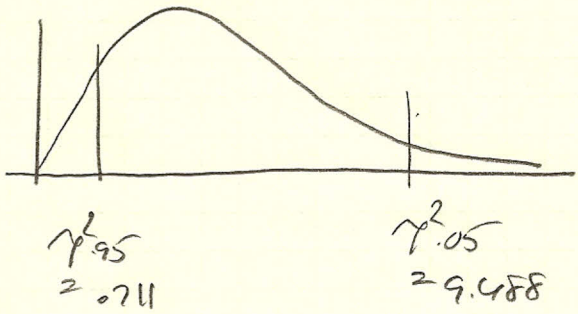
$\bar{X}=3$

$\Sigma X_i^2 = 48.26$

$S^2 = \frac{1}{n-1}(\Sigma X_i^2 - n\bar{X}^2)$

$= \frac{1}{4}(48.26 - 45) = .815$

$\chi^2 = (n-1)\frac{S^2}{\sigma^2} = 4\frac{(.815)}{1} = 3.26$



OUR CI IS $\left(\frac{(n-1)S^2}{\chi^2_{\frac{\alpha}{2}}}, \frac{(n-1)S^2}{\chi^2_{1-\frac{\alpha}{2}}}\right) = \left(\frac{3.26}{9.488}, \frac{3.26}{.711}\right)$

$= (.343, 4.585)$

SINCE $\sigma^2=1$ IS IN CI, THAT CLAIM IS VALID!

---

6) 2 SIDED 99% CI IS

$(\bar{X}-\bar{Y}) \pm t_{.005} S_p\sqrt{\frac{1}{n}+\frac{1}{m}} \rightarrow (64-69) \pm (2.807)(7.92)\sqrt{\frac{1}{11}+\frac{1}{14}}$

$\rightarrow (-5) \pm 8.957$

$\rightarrow 3.9573, -13.957$

23 DOF

$S_p = \sqrt{\frac{(10)(52)+(13)(21)}{23}} = 7.92$

2 SIDED 99% CI IS $(-13.957, 3.957)$

SINCE $(\mu_X - \mu_Y) = 0$ IS IN CI, CONCLUSION IS THAT THERE IS NO DIFFERENCE IN TEACHING METHODS.