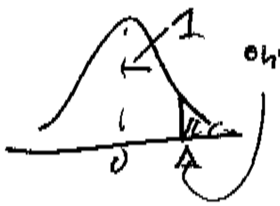
MTH 410 review

1) large sample $H_0: p = .85$ $H_A: p > .85$

$\hat{p} = .92$

$Z = \dfrac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}$ obs $= \dfrac{.92 - .85}{\sqrt{\frac{.85 \cdot .15}{100}}} \approx 1.96$

p-val $= P[Z > \text{observed} \mid H_0]$

$=$ 

$= .025$

or

prop.test(92, 100, p=.85,
alt="greater")

p-val $= 0.03435$

{why different?
{see continuity correction

2) $H_0: p = .1$ $H_A: p > .1$

use T = # greater, T has binomial(n, p) dist

T-obs $= 3$

p-val $= P[T \geq 3] = \sum_{3}^{10} \text{bin}(10, k, p = .1)$

$=$ sum(dbinom(3:10, n=10, p=.1))

$= .07$

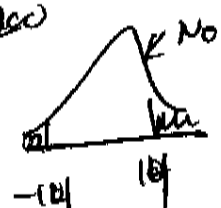
binom.test(
3, 10, p=.1, alt=
"greater")

compare to
prop.test
(p-val $= 0.05692$)

3) $H_0: \mu = 4$, $H_A: \mu \neq 4$

$T = \dfrac{\bar{x} - \mu}{s/\sqrt{n}}$ Normal dist

T-obs $= \dfrac{3 - 4}{1/\sqrt{200}} = -14$

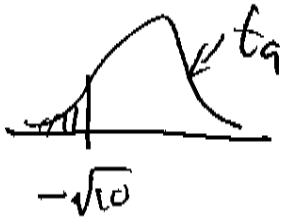
p-val $=$ 

$\doteq 0$

4) $H_0: \mu = 4$ $H_A: \mu < 4$

$T = \frac{\bar{X}-\mu}{S/\sqrt{n}}$ t-dist w/ n-1 df if normal population

obs: $\frac{3-4}{1/\sqrt{10}} = \frac{-1}{1}\sqrt{10} \sim -3.1$.

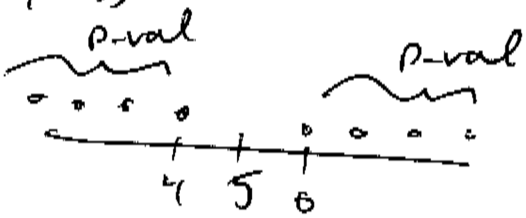
p-val =  pt(-sqrt(10), df=9) = .058.

5) Sign test. $H_0: M=100$, $H_A: M \neq 100$

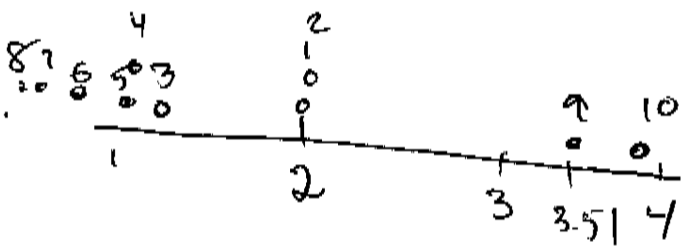
T = # > 100

T-obs = 4 (counting ties)

[ignoring issue with ties in the data]

p-val Expect 5. ($\frac{1}{2} \times 10$) 

p-val = $1 - \binom{10}{5} \frac{1}{2}^5 \frac{1}{2}^5$ which is big.

6 After log. 

T = 9+10 = 19. observed val

~~small vals~~ Two tails.

p-val = $2 \times P[T \leq 19 \mid H_0]$

$= 2 \times .216 = .416$ not small.

6. $H_0: \mu_1 = \mu_2 \quad H_A: \mu_1 \neq \mu_2$

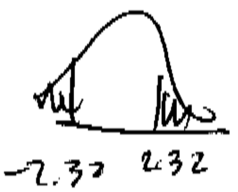
Data

	n	$\bar{x}$	s
	12	27	12
	15	17	10

Assume var. equal.

$$T = \frac{\bar{x}_1 - \bar{x}_2}{SE} \quad SE = S_p \cdot \sqrt{\frac{1}{12} + \frac{1}{15}} \;; \quad S_p^2 = \frac{11 \cdot 12^2 + 14 \cdot 10^2}{24} = 124$$

$$= \frac{10}{4.31} = 2.32$$

$12 + 15 - 2 = 25$ d.f. p-val = 

$= 2 \times pt(-2.32, 25)$
$= 0.0287$.

7. use wilcox.test. $H_0: M_1 = M_2$, $H_A: M_1 > M_2$

faster = smaller median

x=c(9,16,12,...,7)

y=c(6,14,10,...,4)

wilcox.test(x,y, alt="~~less~~ greater")

p-value is 0.2021

others done in class