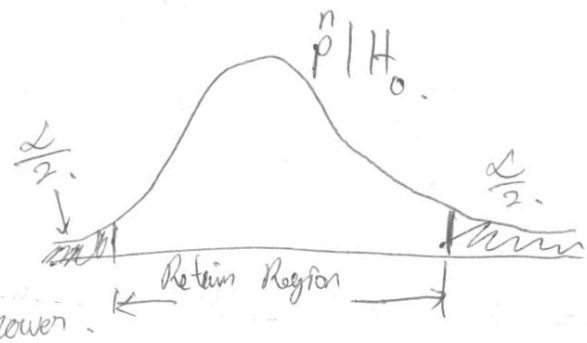
#23. Decision.

	Retain H_0	Reject H_0
H_0 true.	✓	Type I error Prob = α
H_0 false.	Type II error. Prob = β	✓

power.



Consider $\alpha \downarrow \Rightarrow \beta \uparrow$ $\quad n \uparrow = \beta \downarrow$ $\quad n \uparrow$ or $\downarrow \Rightarrow$ no change in α.
$\alpha \uparrow \Rightarrow \beta \downarrow$ $\quad n \downarrow = \beta \uparrow$

Clinical Trial for a drug

H_0: Drug doesn't work, H_a: Drug Works.
Type I error: Selling the drug that doesn't work.
Type II error: Not selling the drug that does work.

Fire alarm system.

H_0: No fire, H_a: Fire.
Type I error: False Alarm.
Type II error: Alarm doesn't go off when there is fire.
$\Rightarrow \alpha$ should be big: Minimal cost.

American Court system.

H_0: Innocent, until he is proven guilty.
H_a: guilty.
Type I error: Innocent but go to jail.
Type II error: Guilty but not go to jail.

Scientific Theory.

H_0: old theory. H_a: New theory.

$\alpha = 1\%$ or 5%.

Human sex $p = 50\%$ (male).

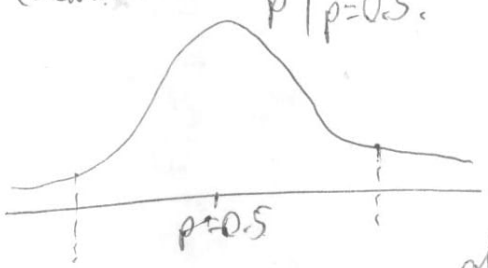
$H_0: p = 50\%$.

$H_a: p \neq 50\%$

$\alpha = 5\%$.

2008 all American Births

$n = 4,247,000$.



old experiment $n = 345$.

Retain Region $= [0.446, 0.554]$

Retain Region $\left[0.5 \pm 2\sqrt{\frac{0.5(0.5)}{4247000}}\right] = [0.495, 0.505]$

male $= 2173000$.

$\hat{p} = \frac{2173000}{4247000} = 0.512 \notin$ Retain Region.

$\therefore$ Reject $H_0 \Rightarrow$ sex isn't even.

$CI_{p,1-\alpha} = \left[\hat{p} \pm \frac{z_\alpha}{2}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}\right]$

Retain Region $= \left[p_0 \pm \frac{z_\alpha}{2}\sqrt{\frac{p_0(1-p_0)}{n}}\right]$

H_0: Don't exist. Aliens.

H_a: Exist.

α low. (ppl can't accept even with proof)

α high (ppl can accept with proof)

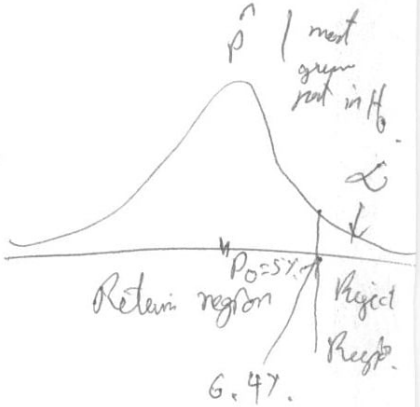
- workB
  - salesSouth.dat
- workC
- salesEast.dat
- salesNorth.dat
- salesWest.dat
- .test1

1 sided prob not be in the exam.

19. Uber fired bad drivers. If the driver has more than 5% bad rating which are bad, they are fired.

20. H_0: Good driver. $p \leq P_0 = 5\%$.

H_a: Bad driver. $p > P_0 = 5\%$.



Ret: Region $(-\infty, P_0 \pm z\alpha \sqrt{\frac{P_0(1-P_0)}{n}})$

$n=1000$, Ret Region $(-\infty, .064)$

6.47.