Chapter 9 Review Sheet Key

(1) $H_0: p = .08$ $\quad$ p = true prop. of elderly diabetic patients who have a heart attack in 5 years.

$H_a: p > .08$

1-sample z-test ~~for~~ prop. @ $\alpha = .01$

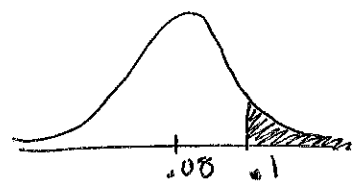
Random: "randomly selected" ✓

Independence: $10(250) = 2500 <$ all elderly diabetics ✓

Normal: $np = 25 > 10$ ✓ $\quad$ assume normal ✓

$n(1-p) = 225 > 10$ ✓

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = 1.166 \longrightarrow \text{p-value} = .1219$$



$p = .08 \quad \hat{p} = \frac{25}{250}$

Since the p-value (.1219) is greater than α (.01) we fail to reject H_0. We do not have sufficient evidence to conclud that Avandia increases the risk of heart attacks in elderly diabetic patients.

(2) Type I error: (Reject H_0 when H_0 is true) → conclude that Avandia does increase heart attacks in elderly diabetics when it does not.

*Consequences: you rule out using a potentially helpful drug because of this unfounded risk.

Type II error: (Fail to reject H_0 when H_0 is false) → conclude that we can't say Avandia increases heart attacks in elderly diabetics when we should conclude that.

*consequences: Giving Avandia to patients without acknowledging the risks of heart attacks.

(3). Yes, with a 90% confidence interval (w/ one sided test area on sides would be $.05 = \alpha$). With a p-value of .1219, which is greater than $\alpha = .05$ we would fail to reject the H_0, which means that $H_0: p = .08$ is still a plausible population proportion.

(4) $H_0 : \mu_d = 0$ μ_d = true mean difference in student scores (Video − No video)

$H_a : \mu_d > 0$ Paired t-test @ $\alpha = .01$

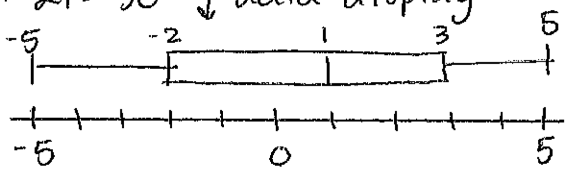
Random: randomly assigned to treatments ✓

Independence: $10(21) = 210 <$ all pairs of students at Bret Harte ✓

or

Randomized experiment implies independence between subjects.

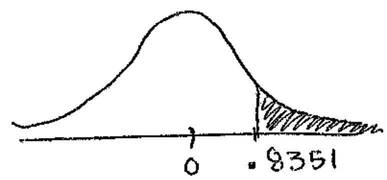
Normal: $21 < 30$? data display



No outliers or strong skew, assume normal

$$t = \frac{\bar{x}_d - \mu_d}{s_d/\sqrt{n}} = .8351$$

↳ p-value = .2068



$df = 21 - 1 = 20$

$n = 42$

Since our p-value (.2068) is greater than α (.01) we fail to reject H_0. We do not have convincing evidence to conclude that the videos improved student scores.

(5) $H_0 : \mu = 56$ μ = true mean weight gain in young cows eating new feed supplement

$H_a : \mu > 56$

1-sample t-test @ $\alpha = .05$

Random: "randomly selected" ✓

Independence: $10(35) = 350 <$ all cows

or

Randomized experiment implies independence between subjects.

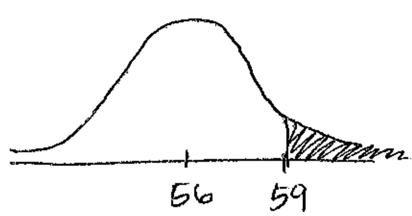
Normal: $35 > 30$ CLT ✓ assume normal.

$$t = \frac{\bar{x} - \mu}{s_x/\sqrt{n}} = 2.465$$

↳ p-value = .0095

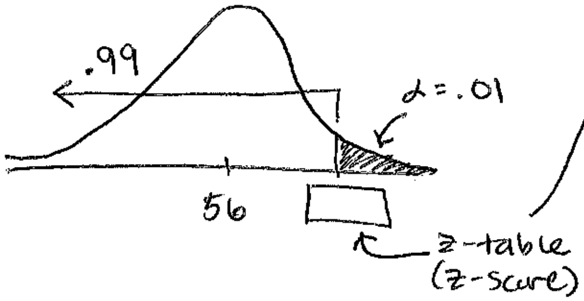
$df = 35 - 1 = 34$

$n = 35$



Since our p-value (.0095) is smaller than α (.05), we reject H_0. We have sufficient evidence to conclude that the new feed supplement increases the weight gain of young cows from 56 pounds per year.

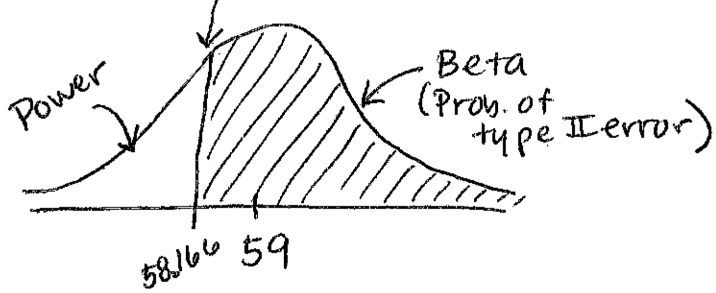
(6) $\sigma = 7.2$ pounds → population standard deviation is known, so we use z/normal distribution.



$$2.33 = \frac{\bar{X} - 56}{7.2/\sqrt{60}}$$

$$\boxed{\bar{X} \geq 58.166 \text{ pounds}}$$

(7) true pop. mean = 59



$$z = \frac{58.166 - 59}{7.2/\sqrt{60}} = -.8972$$

z-table

$$\boxed{\text{Power} = .1841}$$

$$1 - \text{Power} = \text{Beta} = 1 - .1841 = .8159$$

$$\boxed{\text{Beta} = .8159}$$