

9.12

STAT 515 Homework #5 - Mathew Houser

(a) Assume equal variances $\alpha = 0.05$

$$H_0: (\mu_1 - \mu_2) = 0 \quad H_a: (\mu_1 - \mu_2) \neq 0$$

$$S_p^2 = \frac{(16)(3.4)^2 + (11)(4.8)^2}{17+12-2} = 16.237$$

$$df = 17+12-2 = 27 \quad t_{\alpha/2} = t_{0.025} = 2.052$$

$$t_c = \frac{5.4 - 7.9}{\sqrt{S_p^2(\frac{1}{17} + \frac{1}{12})}} = -1.65$$

Reject Region: $|t_c| > 2.052$

The calculated test statistic does not fall within the reject region, therefore there is insufficient evidence to conclude that the true difference in means $\mu_1 - \mu_2 = 0$.

(b) 95% CI = (-5.62, 0.62)

We are 95% confident that the true difference in means is between -5.62 and 0.62.

(a) mean time on the Trail Making Test

(b) $H_0: (\mu_1 - \mu_2) = 0 \quad H_a: (\mu_1 - \mu_2) > 0$ (c) the reported p-value of $0.061 < \alpha = 0.01$, thus there is sufficient evidence to conclude that the mean time on the Trail Making Test is larger for individuals with schizophrenia.

(d) 99% CI = (22.75, 61.23)

We are 99% confident that the true difference in mean time to complete the Trail Making Test is between 22.75 and 61.23 minutes.

This is concurent with the results from part c, there is sufficient evidence to conclude that the true difference in means $(\mu_1 - \mu_2) > 0$.

$$H_0: (\mu_1 - \mu_2) = 0 \quad H_a: (\mu_1 - \mu_2) \neq 0$$

$$3.70 - 3.30$$

$$t^* = \frac{\sqrt{(1.98)^2 + (2.13)^2}}{2.0} = 0.62$$

9.16

9.17

(c)

(d) $|t^*| > 2.750 \quad (\alpha = 0.10, df = 38)$

The calculated test statistic does not fall within the rejection region, therefore there is insufficient evidence to ~~support the researcher's~~

~~researcher's~~ conclude that the true mean recall varies between the Video and A/V groups, which supports the researcher's theory that both groups will have the same level of mean recall.

(e)

The reported p-value of 0.62 is greater than the significance level $\alpha = 0.10$ therefore there is insufficient evidence to conclude that the two means differ.

(f)

Two samples are selected randomly in an independent manner; Both sample populations are approximately normal; Samples are both the same size.

9.64

(a) $\hat{p}_D = 662/1250 = 0.53$

(b) $\hat{p}_R = 586/930 = 0.63$

(c) $\hat{p} = (662 + 586)/(1250 + 930) = 0.57$

(d) $95\% \text{ CI} = (-0.142, -0.058)$

$$(0.53 - 0.63) \pm 1.96 \sqrt{\frac{(0.53)(1-0.53)}{1250} + \frac{(0.63)(1-0.63)}{930}}$$

(e) We are 95% confident that the true difference in proportions of Democrats and Republicans that prefer steak is between -0.142 and -0.058

(f) 95% of all samples taken from the population will ~~be~~ result in a difference in sample proportions that is between -0.142 and -0.058.

9.66

- (a)
(b)
(c)
(d)

$$17/60 = 0.28$$

$$12/60 = 0.20$$

b/c the samples represent independent binomial samples

χ^2 , test + correctness

H_0 : Group ~~1~~ and ~~2~~ are independent

H_a : Group ~~1~~ and ~~2~~ are dependent

$$\chi_c^2 = \sum \frac{[n_{ij} - \hat{E}_{ij}]^2}{\hat{E}_{ij}} = 1.137$$

Reject Region: $\chi_c^2 > 7.879$

The calculated test statistic is not in the

reject region, therefore there is insufficient evidence to conclude that the percentage of students that answer correctly is dependent on which group the student is assigned to.

completely randomized Balanced Design: Single Factor

experimental unit: college students

dependent variable: Tanning Attitude Index

treatments: Tanned Models; Not tanned Models; No models.

(c) $H_0: \mu_1 = \mu_2 = \mu_3$

(d) we must account for sampling variability between experimental units and treatments

(e) Reject Region: $F > 3.00$

The ~~was~~ reported ~~F~~ test statistic $F = 3.60$ falls within the rejection region, and the reported p-value

0.03 is smaller than the significance level $\alpha = 0.05$,

therefore there is sufficient evidence to conclude that the mean Tanning Attitude Index value varies between treatment groups

(f) Samples are randomly selected in an independent manner;
sample populations have approx. normal distribution;
population variances are equal

10.

33(a)

(b)

completely randomized Balanced Design: Single Factor

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(f) Samples are randomly selected in an independent manner;
sample populations have approx. normal distribution;
population variances are equal

10.37

- (a) The 324 adults sampled
- (b) Recall of Brand names
- (c) (V) rating; (S) rating; Neutral Rating
- (d) You must account for differences in the Sampling variability between experimental units and treatments.
- (e) $F = 20.45$ $p\text{-value} = 0.000$
- (f) Reject Region: $F > 4.61$.

The reported test statistic $F = 20.45 > 4.61$ falls within the rejection region, and the reported $p\text{-value} = 0.000 < \alpha = 0.01$; therefore there is sufficient evidence to conclude that the recall of commercial brand names is impacted by violence and sex in a TV show.