

## Exam 2 Answers Wi18

- 1 a) Type I b) Alternative c) Type II d) p-value e) Dependent
- 2 Not valid.  $pvalue = P(\text{data this extreme} \mid H_0 \text{ is true})$  NOT  $P(H_0 \text{ is true} \mid \text{data this extreme})$
- 3 a)  $23.1 \pm 2.85$  or  $(20.25, 25.95)$  (use  $t=1.708$ )  
b) increase  
c) increase  
d) (third choice) With 95% confidence we can conclude the **population** mean age of community college instructors is between the two endpoints of the confidence interval . (interpretation never about sample)
- 4 a)  $H_a$ : More than 70% of California's registered voters who support combating climate change by following the guidelines of the Paris Agreement.  
 $H_0: p \leq .70$   $H_a: p > .70$ ,  
Type II error
- 5 b)  $H_0$ : The mean annual income in San Jose is \$77000.  
 $H_0: \mu = 77000$   $H_a: \mu \neq 77000$   
There is insufficient evidence to conclude the mean income in San Jose is not \$77000. (4<sup>th</sup> choice)
- 6 a)  $H_0: p \leq .70$   $H_a: p > .70$  One population Z-test of proportion  
b)  $H_0: \mu_1 = \mu_2$   $H_a: \mu_1 \neq \mu_2$  t-test independent sampling, pooled variance  
c)  $H_0: \mu_d \leq 0$   $H_a: \mu_d > 0$  t-test dependent sampling, matched pairs  
d)  $H_0: \sigma \leq 50$   $H_a: \sigma > 50$  One Population, Chi-square test of variance
- 7 a) The mean amount of data used on smart phones is less than 20 gigabytes per month  
b)  $H_0: \mu \geq 20$   $H_a: \mu < 20$  c)(left to right) top graph .05, 20 bottom graph 18, .10  
d) 2 e) Increase f) Reject  $H_0$
- 8 a) Not Valid – Only population parameters in  $H_0, H_a$   
b) Not Valid – Equality should be in  $H_0$   
c) Valid  
d) Not Valid –  $H_a$  should contradict  $H_0$
- 9 **Design:**  $H_a$ : Mean Rents for one bedroom apartments in Berkeley and Oakland are different.  
 $H_0: \mu_1 = \mu_2$   $H_a: \mu_1 \neq \mu_2$ ,  $\alpha = .05$ , Reject  $H_0$  if  $pvalue < \alpha$   
Pooled Variance t-test because Independent Sampling and F-test comparing two variances  $pvalue = .1475 > .05$ .  
**Data:** Reject  $H_0$  ( $pvalue = .0186$ )  
**Conclusion:** b and c are valid (c is valid, because once you Reject  $H_0$  in a two- tailed test, you can specify direction based on the sample data.)

## Descriptive Statistics: E1, E2

| Variable | N  | Mean  | StDev | Minimum | Q1    | Median | Q3    | Maximum | IQR   |
|----------|----|-------|-------|---------|-------|--------|-------|---------|-------|
| E1       | 37 | 71.86 | 12.52 | 46.00   | 63.00 | 70.00  | 80.50 | 96.00   | 17.50 |
| E2       | 37 | 71.89 | 15.10 | 34.00   | 60.50 | 75.00  | 85.00 | 96.00   | 24.50 |

## Paired T-Test and CI: E1, E2

Paired T for E1 - E2

|            | N  | Mean  | StDev | SE Mean |
|------------|----|-------|-------|---------|
| E1         | 37 | 71.86 | 12.52 | 2.06    |
| E2         | 37 | 71.89 | 15.10 | 2.48    |
| Difference | 37 | -0.03 | 10.08 | 1.66    |

95% CI for mean difference: (-3.39, 3.33)

T-Test of mean difference = 0 (vs  $\neq$  0): T-Value = -0.02 P-Value = 0.987

