EDUC/PSY 6600

Name:

Research Design & Analysis I

**Unit 2 Assignment**

**Groundwork for Inference**

Please complete the following exercises. Feel free to work with classmates, but each student must turn in **UNIQUE** work, not photocopies or identical replicates. When applicable, use **APA format** in communicating your results in text. **Show your work!** If any question involves any math at all, show your work. When it doubt, write it out. Always show more than you think you need.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1) WRITE-UP - Textbook Problems | | | | | | | | | | | | |
|  | Cohen Chap | | Exercises | | | Pts | | | Off | | |
|  | 5 | A | \*1, 2, \*5, 6, 7, 9, 10 | | | 6 | | |  | | |
|  | B | \*1, \*8, 9, \*10 **11, 12, 13 🡨Advance Section** | | | 6 | | |  | | |
|  | C | 3, 4 | | | 2 | | |  | | |
|  | 6 | A | \*1, 2, 4, \*5, 6 | | | 6 | | |  | | |
|  | B | \*1, 2, \*4, 5, 8 | | | 5 | | |  | | |
|  | C | 1, 2, 3 | | | 2 | | |  | | |
|  | 7 | A | \*7, 8 | | | 2 | | |  | | |
|  | B | \*3, \*4, 6 | | | 3 | | |  | | |
|  | C | 1, 5 | | | 2 | | |  | | |
|  | 8 | A | 3, 9, \*10 | | | 3 | | |  | | |
|  | B | 6 | | | 1 | | |  | | |
|  | C | 2 (altered) *(Use G-Power, no syntax or code)* | | | 1 | | |  | | |
|  | | | | | | | | | |  | | |
| 2) SUMMARY – Supplementary Reading | | | | | | | | | | | | |
|  | The ASA’s Statement on p-Values: Context, Process, and Purpose | | | | | Pts | | Off | | |
|  | Half Page | | Read the article and summarize the main points for future reference. | | | 5 | | |  | | |
|  |  | |  | | |  | | |  | | |
| |  | | --- | | 3) R SYNTAX – Section C: Ihno’s data set – add to the skeleton R notebook and knit to .pdf & upload | | | | | | | | | | | | | |
|  | Cohen Chap | | Exercises | | | Pts | | | Off | | |
|  | 5 | C | 3, 4 | | | 2 | | |  | | |
|  | 6 | C | 1, 2, 3 | | | 2 | | |  | | |
|  | 7 | C | 1, 5 | | | 2 | | |  | | |
|  |  |  |  | | |  | | |  | | |
| Grading | | | | | Earned | | Possible | | | | | | |
|  | ***correctness*** | | | *a subset of spot-checked items: must show work, especially items from back of book or done in class* |  | | 50 | | | | | | |
|  | ***COMPLETENESS*** | | | *more than one item is missing or skipped: 25/50*  *roughly half the assignment is completed: 10/50* |  | | 50 | | | | | | |
|  |  |  | |  |  | | 100 | | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **5** | **A** | **\*1. Calculated** **z-value 🡪 p-value … 1-tailed & 2-tailed** | | | | |
| 1. If the **calculated z** for an experiment equals **1.35**,   **1-tail: p = \_\_\_\_\_\_\_ 2-tail: p = \_\_\_\_\_\_\_**  what is the corresponding **p-value**? | | | | | |
| 1. If the **calculated** **z** for an experiment equals **- 0.7**,   **1-tail: p = \_\_\_\_\_\_\_ 2-tail: p = \_\_\_\_\_\_\_**  what is the corresponding **p-value**? | | | | | |
| 1. If the **calculated z** for an experiment equals **2.2**,   **1-tail: p = \_\_\_\_\_\_\_ 2-tail: p = \_\_\_\_\_\_\_**  what is the corresponding **p-value**? | | | | | |
| **5** | **A** | **2. alpha 🡪 critical z-value … 1-tailed & 2-tailed** | | | | |
| 1. If **alpha** were set to the unusual value of **.08,**   **1-tail: zcv = \_\_\_\_\_\_\_ 2-tail: zcv = \_\_\_\_\_\_\_**  what would be the magnitude of the **critical z**? | | | | | |
| 1. If **alpha** were set to the unusual value of **.03**,   **1-tail: zcv = \_\_\_\_\_\_\_ 2-tail: zcv = \_\_\_\_\_\_\_**  what would be the magnitude of the **critical z**? | | | | | |
| 1. If **alpha** were set to the unusual value of **.007**,   **1-tail: zcv = \_\_\_\_\_\_\_ 2-tail: zcv = \_\_\_\_\_\_\_**  what would be the magnitude of the **critical z**? | | | | | |
| **5** | **A** | **\*5. sample mean 🡪 p-value (2-tailed)** | | | | |
| An English professor suspects that her current class **of 36 students** is unusually good at verbal skills. She looks up the verbal SAT score for each student and is pleased to find that the **mean for the class is 540**.  Assuming that the general population of students has a **mean verbal SAT score of 500** with a **standard deviation of 100**, what is the **two-tailed** p value corresponding to this class? | | | | | |
| **2-tail: p = \_\_\_\_\_\_\_\_\_**  **z = \_\_\_\_\_\_\_\_\_**  **POPULATION PARAMETERS**  µ = \_\_\_\_\_\_\_  σ = \_\_\_\_\_\_\_  **SAMPLE STATISTICS**  = \_\_\_\_\_\_\_  = \_\_\_\_\_\_\_  **n = \_\_\_\_\_\_\_** | | | | | |
| **5** | **A** | **6. Very large z-score** | | | | | | | |
| Consider a situation in which you have **calculated the z score** for a group of participants and have obtained the unusually high value of **20**.  Which of the following statements would be **true**, and which would be **false**?  **Explain** your answer in each case. | | | | | | | |
| 1. You must have made a calculation error because z scores cannot get so high. | | | | | | | |
| 🞐 TRUE 🞐 FALSE | | | | **EXPLAIN**. | | | | |
| 1. The null hypothesis cannot be true. | | | | | | | |
| 🞐 TRUE 🞐 FALSE | | | **EXPLAIN**. | | | | |
| 1. The null hypothesis can be rejected, even if a very small alpha is used. 7 | | | | | | | |
| 🞐 TRUE 🞐 FALSE | | | **EXPLAIN**. | | | | |
| 1. The difference between the sample mean and the hypothesized population mean must have been quite large. | | | | | | | |
| 🞐 TRUE 🞐 FALSE | | | | | **EXPLAIN**. | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **5** | **A** | **7. Very large z-score** | | |
| Suppose the z score mentioned in Exercise 6 involved the measurement of height for a group of men. If **μ = 69 inches** and **σ = 3 inches**, **how** can a group of men have a **z score equal to 20**? | | | | |
| Give a **numerical example** illustrating how this can occur. | | | | |
| **5** | **A** | **9. One-tail vs. Two-tails** | | |
| **Describe** a situation in which a **one-tailed** hypothesis test seems justified. | | | | |
|  | | | | |
| **Describe** a situation in which a **two-tailed** test is clearly called for. | | | | |
|  | | | | |
| **5** | **A** | **10. One-tail vs. Two-tails** | | |
| **Describe** a case in which it would probably be appropriate to use an **alpha smaller** than the conventional .05 (e.g., .01). | | | | |
|  | | | | |
| **Describe** a case in which it might be appropriate to use an unusually **large alpha** (e.g., .1). | | | | |
|  | | | | |
| **5** | **B** | **\*1. Hypothesis test: Mean (z-score)** | | |
| A psychiatrist is testing a new antianxiety drug, which seems to have the potentially harmful side effect of lowering the heart rate. For a **sample of 50** medical students whose pulse was measured after 6 weeks of taking the drug, the **mean heart rate was 70 beats per minute** (bpm).  **If** the mean heart rate for the **population** is **72 bpm** with a **standard deviation of 12**, can the psychiatrist conclude that the new drug lowers heart rate significantly? (Set alpha = .05 and perform a one-tailed test.) | | | | |
| 🞐 *Provides evidence that new drug lowers heart rate*  **H0 : \_\_\_\_\_\_\_\_\_**  **Ha : \_\_\_\_\_\_\_\_\_**  **POPULATION PARAMETERS**  µ = \_\_\_\_\_\_\_  σ = \_\_\_\_\_\_\_  **SAMPLE STATISTICS**  = \_\_\_\_\_\_\_  = \_\_\_\_\_\_\_  **n = \_\_\_\_\_\_\_**  **1-tail: p = \_\_\_\_\_\_\_\_\_**  **z = \_\_\_\_\_\_\_\_\_**  🞐 *No evidence that the new drug lowers heart rate* | | | | |
| **5** | **B** | **\*8. sample mean 🡪 p-value (2-tailed)** | | |
| Imagine that you are testing a new drug that seems to **raise** the number of T cells in the blood and therefore has enormous potential for the treatment of disease. After treating **100 patients**, you find that their **mean T cell count is 29.1**. Assume that **μ and σ (hypothetically) are 28 and 6**, respectively. | | | | |
| **2-tail: p = \_\_\_\_\_\_\_\_\_**  **z = \_\_\_\_\_\_\_\_\_**  **H0 : \_\_\_\_\_\_\_\_\_**  **Ha : \_\_\_\_\_\_\_\_\_**  **POPULATION PARAMETERS**  µ = \_\_\_\_\_\_\_  σ = \_\_\_\_\_\_\_  **SAMPLE STATISTICS**  = \_\_\_\_\_\_\_  = \_\_\_\_\_\_\_  **n = \_\_\_\_\_\_\_** | | | | |
| 1. Test the null hypothesis at the **.05 level, two-tailed.** | | | 🞐 *Provides evidence that new drug increases T cells*  🞐 *No evidence that the new drug increases T cells* | |
| 1. Test the same hypothesis at the **.10 level, two-tailed**. | | | 🞐 *Provides evidence that new drug increases T cells*  🞐 *No evidence that the new drug increases T cells* | |
| 1. **Describe** in practical terms what it would mean to **commit a Type I error** in this example. | | | | |
| 1. **Describe** in practical terms what it would mean to **commit a Type II error** in this example. | | | | |
| 1. How might you **justify** the use of .10 for alpha in similar experiments? | | | | |
| **5** | **B** | **9. Effect of the Population SD on the z-score** | | |
| 1. Assuming everything else in the previous problem stayed the same, what would happen to your **calculated z** if the **population standard deviation ( σ ) were 3 instead of 6**? | | | | |
|  | | | | |
| 1. What **general statement** can you make about how changes in σ affect the calculated value of z ? | | | | |
| **z = \_\_\_\_\_\_\_\_\_ 🡪 \_\_\_\_\_\_\_\_\_** | | | | |
| **5** | **B** | **\*10. Sample size requirements** | | |
| Referring to Exercise 8, suppose that **mean () is equal to 29.1** *regardless of the sample size*. | | | | |
| **How large would n** have to be for the calculated z to be statistically significant at the **.01 level (two-tailed)?**  **n = \_\_\_\_\_\_\_\_\_** | | | | |
| **5** | **B** | **11. Define ‘alpha’** | | |
| **Alpha stands for** which of the following? | | | | |
| 1. The proportion of experiments that will attain statistical significance | | | | 🞐 TRUE |
| 1. The proportion of experiments for which the null hypothesis is true that will attain statistical significance | | | | 🞐 TRUE |
| 1. The proportion of statistically significant results for which the null hypothesis is true | | | | 🞐 TRUE |
| 1. The proportion of experiments for which the null hypothesis is true | | | | 🞐 TRUE |
| **5** | **B** | **12. Errors in hypothesis testing** | | |
| In the last few years, an organization has conducted **200 clinical trials** to test the effectiveness of antianxiety drugs.  Suppose, however, that **all** of those drugs were obtained from the same **fraudulent** supplier, which was later revealed to have been sending only inert substances (e.g., distilled water, sugar pills) instead of real drugs. If **alpha = .05** was used for all hypothesis tests… | | | | |
| How many **of these 200** experiments would you expect to **yield significant** results? | | | | |
| How many **Type I errors** would you expect? | | | | |
| How many **Type II errors** would you expect? | | | | |
| **5** | **B** | **13. Errors in hypothesis testing** | | |
| Since she arrived at the university, Dr. Pine has been very productive and successful. She has already performed **20 experiments** that have **each** attained the .**05** level of statistical significance. | | | | |
| What is your best guess for the number of **Type I errors** she has made so far? | | | | |
| For the number of **Type II errors**? | | | | |
| **5** | **C** | **3. Hypothesis test: Mean (z-score)** | | |
| 1. **In the past** 10 years, previous stats classes who took the same **mathquiz** that Ihno’s students took **averaged 28** with a **standard deviation of 8.5**. What is the **two-tailed p value** for Ihno’s students with respect to that past population? *(Don’t forget that the N for mathquiz is not 100.)*   **write code to find mean & n in your R syntax file** | | | | |
| **H0 : \_\_\_\_\_\_\_\_\_**  **Ha : \_\_\_\_\_\_\_\_\_**  **POPULATION PARAMETERS**  µ = \_\_\_\_\_\_\_  σ = \_\_\_\_\_\_\_  **SAMPLE STATISTICS**  = \_\_\_\_\_\_\_  = \_\_\_\_\_\_\_  **n = \_\_\_\_\_\_\_**  **2-tail: p = \_\_\_\_\_\_\_\_\_**  **z = \_\_\_\_\_\_\_\_\_** | | | | |
| Would you say that Ihno’s class performed **significantly better** than previous classes? | | | | |
| 🞐 ***Provides evidence*** *Ihno’s class performed* ***significantly better*** *than previous classes*  🞐 ***No evidence*** *that Ihno’s class performed any differently than previous classes*  ***EXPLAIN****.* | | | | |

|  |  |  |
| --- | --- | --- |
| **5** | **C** | **3. Hypothesis test: Mean (z-score)** |
| 1. **In the past** 10 years, previous stats classes who took the same **statquiz** that Ihno’s students took **averaged 6.1** with a s**tandard deviation of 2.5**. What is the **two-tailed p value** for Ihno’s students with respect to that past population?   **write code to find mean & n in your R syntax file** | | |
| **H0 : \_\_\_\_\_\_\_\_\_**  **Ha : \_\_\_\_\_\_\_\_\_**  **POPULATION PARAMETERS**  µ = \_\_\_\_\_\_\_  σ = \_\_\_\_\_\_\_  **SAMPLE STATISTICS**  = \_\_\_\_\_\_\_  = \_\_\_\_\_\_\_  **n = \_\_\_\_\_\_\_**  **2-tail: p = \_\_\_\_\_\_\_\_\_**  **z = \_\_\_\_\_\_\_\_\_** | | |
| Would you say that Ihno’s class performed **significantly better** than previous classes? | | |
| 🞐 ***Provides evidence*** *Ihno’s class performed* ***significantly better*** *than previous classes*  🞐 ***No evidence*** *that Ihno’s class performed any differently than previous classes*  ***EXPLAIN****.* | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **5** | **C** | | **4. Hypothesis test: Mean (z-score)** |
| Test both the **mathquiz** and **statquiz** variables for their resemblance to **normal distributions**.  Based on **skewness**, **kurtosis**, and the **Shapiro-Wilk statisti**c, which variable has a sample distribution that is **not** very consistent with the *assumption of normality in the population*? | | | |
| **MATHQUIZ** | | <-- Type **R code** into Skeleton and Knit to get **pdf** including output  **Skewness**  \_\_\_\_\_\_\_\_\_    **Kurtosis**  \_\_\_\_\_\_\_\_\_  **Shapiro-Wilk**  stat = \_\_\_\_\_\_\_  p = \_\_\_\_\_\_\_  🞐 ***NORMAL*** *(or normal’ish)* 🞐 ***NOT NORMAL***  *Sketch a plot you made in R by hand (histogram &/or qq plot)* | |
| **STATQUIZ** | | <-- Type **R code** into Skeleton and Knit to get **pdf** including output  **Skewness**  \_\_\_\_\_\_\_\_\_    **Kurtosis**  \_\_\_\_\_\_\_\_\_  **Shapiro-Wilk**  stat = \_\_\_\_\_\_\_  p = \_\_\_\_\_\_\_  🞐 ***NORMAL*** *(or normal’ish)* 🞐 ***NOT NORMAL***  *Sketch a plot you made in R by hand (histogram &/or qq plot)* | |
| **6** | **A** | | **\*1. Standard Error for the Mean** |
| The unbiased **variance** (s2) **200** participants is **55**. | | | |
| 1. What is the value of the estimated **standard error of the mean** ()? | | | |
| 1. If the variance were the same but the sample were increased to **1800 participants**, what would be the new value of ?   **= \_\_\_\_\_\_\_\_\_**  **= \_\_\_\_\_\_\_\_\_** | | | |
| **6** | **A** | | **2. Sample Mean: z-score and p-value** |
| A survey of **144 college students** reveals a mean beer consumption **rate of 8.4** beers per week, with a **standard deviation of 5.6**. | | | |
| 1. If the **national average is seven** beers per week, what is **the z score** for the college students?   What **p value** does this correspond to?  **2-tail: p = \_\_\_\_\_\_\_\_\_**  **z = \_\_\_\_\_\_\_\_\_**  **POPULATION PARAMETERS**  H0: µ = \_\_\_\_\_\_\_  **SAMPLE STATISTICS**  = \_\_\_\_\_\_\_  SD: = \_\_\_\_\_🡪 SE: = \_\_\_\_\_\_\_  **n = \_\_\_\_\_\_\_** | | | |
| 1. If the **national average were four** beers per week, what would the **z score** be?   What can you say about the **p value** in this case?  **2-tail: p = \_\_\_\_\_\_\_\_\_**  **z = \_\_\_\_\_\_\_\_\_** | | | |
| **6** | **A** | | **4. One Sample Mean: df and Critical Values of t** |
| 1. In a one-group t test based on a sample of **20 participants**,   **df = \_\_\_\_\_\_\_\_\_**  what is the value for df? | | | |
| 1. What are the **two-tailed critical t** values for alpha = .05? For alpha = .01?   **α =.05: tcv = \_\_\_\_\_\_\_ α =.01: tcv = \_\_\_\_\_\_\_** | | | |
| 1. What is the **one-tailed critical t** for alpha = .05?   **α =.05: tcv = \_\_\_\_\_\_\_ α =.01: tcv = \_\_\_\_\_\_\_**  For alpha = .01? | | | |
| **6** | **A** | | **\*5. One Sample Mean: t-score and Critical Values of t (change n)** |
| **Twenty-two stroke patients** performed a maze task. The **mean** number of trials () for success was **14.7** with **s = 6.2**. If the **population mean** ( μ ) for this task is **6.5…** | | | |
| 1. What is the calculated value for t ? What is the critical t for a **.05**, **two-tailed** test?   **tCV = \_\_\_\_\_\_\_\_\_**  **t( \_\_\_ ) = \_\_\_\_\_\_\_\_\_**  **POPULATION PARAMETERS**  H0: µ = \_\_\_\_\_\_\_  **SAMPLE STATISTICS**  = \_\_\_\_\_\_\_  SD: = \_\_\_\_\_🡪 SE: = \_\_\_\_\_\_\_  **n = \_\_\_\_\_\_\_** | | | |
| 1. If only **11 patients** had been run but the data were the same as in part a, what would be the calculated value for t ?   **tCV = \_\_\_\_\_\_\_\_\_**  **t( \_\_\_ ) = \_\_\_\_\_\_\_\_\_**  How does this value compare with the t value calculated in part a? | | | |
| **6** | **A** | | **6. One Sample Mean: t-score and Critical Values of t (change n)** |
| 1. Referring to **part a** of Exercise 5, what would the **calculated t value** be if **s = 3.1** (all else remaining the same)?   **t( \_\_\_ ) = \_\_\_\_\_\_\_\_\_** | | | |
| 1. Comparing the t values you calculated for Exercises 5a and 6a, what can you say about the relation between t and the sample standard deviation? | | | |
| **6** | **B** | | **\*1. One Sample Mean: t-test** |
| A high school is proud of its advanced chemistry class, in which its **16 students** scored an **average of 89.3** on the statewide exam, with **s = 9**. | | | |
| 1. Test the null hypothesis that the advanced class is just a random selection from the state population **( μ = 84.7),** using alpha = **.05 (two**-tailed).   **POPULATION PARAMETERS**  H0: µ = \_\_\_\_\_\_\_  **SAMPLE STATISTICS**  = \_\_\_\_\_\_\_  SD: = \_\_\_\_\_🡪 SE: = \_\_\_\_\_\_\_  **n = \_\_\_\_\_\_\_**  http://www.psychstat.missouristate.edu/introbook/sbgraph/normal0.gif  **tCV = \_\_\_\_\_\_\_\_\_**  **t( \_\_\_ ) = \_\_\_\_\_\_\_\_\_**  **2-tail: p = \_\_\_\_\_\_\_\_\_\_\_\_\_\_**  🞐 ***Provides evidence*** *the advanced chemistry class at this school is not a random selection from the state.*  🞐 ***No evidence*** *that the advanced chemistry class at this school is not a random selection from the state.* | | | |
| 1. Test the same hypothesis at the **.01 level (two**-tailed).   🞐 ***Provides evidence*** *the advanced chemistry class at this school is not a random selection from the state.*  🞐 ***No evidence*** *that the advanced chemistry class at this school is not a random selection from the state*  Considering your decision with respect to the null hypothesis, what type of error (Type I or Type II) **could you be making**?  🞐 Type I  🞐 Type II | | | |
| **6** | **B** | | **2. One Sample: t-test for Mean** |
| Are serial killers more introverted than the general population?  A sample of **14 serial killers** serving life sentences was tested and found to have a **mean** introversion score () of **42** with **s = 6.8**. If the **population mean ( μ ) is 36**, are the serial killers significantly more introverted at the .05 level? (Perform the appropriate **one-tailed test**, *although normally it would not be justified*.) | | | |
| **POPULATION PARAMETERS**  H0: µ = \_\_\_\_\_\_\_  **SAMPLE STATISTICS**  = \_\_\_\_\_\_\_  SD: = \_\_\_\_\_🡪 SE: = \_\_\_\_\_\_\_  **n = \_\_\_\_\_\_\_**  http://www.psychstat.missouristate.edu/introbook/sbgraph/normal0.gif  **tCV = \_\_\_\_\_\_\_\_\_**  **t( \_\_\_ ) = \_\_\_\_\_\_\_\_\_**  **1-tail: p = \_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **EXPLAIN CONCLUSION:** Are serial killers more introverted than the general population?  🞐 Yes  🞐 NO | | | |
| **6** | **B** | | **\*4. One Sample: Confidence Interval for the Mean** |
| A psychologist studying the dynamics of marriage wanted to know how many hours per week the average American couple spends discussing marital problems. The sample **mean** () of **155 randomly selected** couples turned out to be **2.6 hours**, with **s = 1.8.** | | | |
| 1. Find the **95% confidence interval for the mean** ( μ ) of the population.   **POPULATION PARAMETERS**  µ 🡨 95% CI for  **SAMPLE STATISTICS**  = \_\_\_\_\_\_\_  SD: = \_\_\_\_\_🡪 SE: = \_\_\_\_\_\_\_  **n = \_\_\_\_\_\_\_**  **tCV = \_\_\_\_\_\_\_\_\_**  **95% CI: ( \_\_\_\_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_\_\_ )** | | | |
| 1. A European study had already estimated the population mean to be **3 hours per week** for European couples. Are the American couples **significantly different** from the European couples at the **.05 level?**   🞐 Yes  🞐 NO  Show how your answer to part a makes it easy to answer part b. | | | |
| **6** | **B** | | **5. Sample Size 🡨 wideth of CI** |
| If the psychologist in exercise 4 wanted the **width of the confidence interval to be only half an hour**, how many couples would have to be sampled? | | | |
| **n = \_\_\_\_\_\_\_\_\_** | | | |
| **6** | **B** | | **8. One Sample: Confidence Interval for the Mean** |
| A psychologist would like to know how many casual friends are in the average person’s social network. She interviews a random sample of people and determines for each the **number of friends** or social acquaintances they see or talk to at least once a year. The data are as follows:  **5, 11, 15, 9, 7, 13, 23, 8, 12, 7, 10, 11, 21, 20, 13** | | | |
| 1. Find the **90% confidence interval for the mean** number of friends for the entire population.   **POPULATION PARAMETERS**  µ 🡨 CI for  **SAMPLE STATISTICS**  = \_\_\_\_\_\_\_  SD: = \_\_\_\_\_ 🡪 SE: = \_\_\_\_\_\_\_  **n = \_\_\_\_\_\_\_**  **tCV = \_\_\_\_\_\_\_\_\_**  **90% CI: ( \_\_\_\_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_\_\_ )** | | | |
| 1. Find the **95%** CI. | | | |
| 1. If a previous researcher had predicted a **population mean of 10** casual friends per person, could that prediction be **rejected as an hypothesis at the .05 level, twotailed**?   **tCV = \_\_\_\_\_\_\_\_\_**  **95% CI: ( \_\_\_\_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_\_\_ )**  🞐 Yes  🞐 NO  **EXPLAIN**. | | | |
| **6** | **C** | | **1. One Sample: Confidence Interval for the Mean** |
| Perform **one-sample t tests** to determine whether the baseline, pre-, or postquiz **anxiety scores** of Ihno’s students differ significantly ( α = **.05, two**-tailed) from the mean **( μ = 18**) found by a very large study of college students across the country. Find the **95% CI for the population mean** for each of the three anxiety measures.  Type **R code** into Skeleton and Knit to get **pdf** including output | | | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | **Sample Mean** | **95% CI**  (71.63, 72.91) | **Test value = 18**  t(99) = 24.744, p=.013 | **Ihno’s different?** | | Baseline |  |  |  | 🞐 Different  🞐 Same | | Pre-quiz |  |  |  | 🞐 Different  🞐 Same | | Post-Quiz |  |  |  | 🞐 Different  🞐 Same | | | | |
| **6** | **C** | | **2. One Sample: Confidence Interval for the Mean** |
| Perform a one-sample t test to determine whether the average **baseline heart rate** of Ihno’s **male** students differs significantly from the mean HR **( μ = 70**) for college-aged men at the **.01 level, two**-tailed. Find the **99% CI** for the population mean represented by Ihno’s male students. | | | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | **Sample Mean** | **95% CI**  (71.63, 72.91) | **Test value = 70**  t(99) = 24.744, p=.013 | **Ihno’s different?** | | MALE  Baseline |  |  |  | 🞐 Different  🞐 Same | | | | |
| **6** | **C** | | **3. One Sample: Confidence Interval for the Mean** |
| Perform a one-sample t test to determine whether the average **postquiz heart rate** of Ihno’s **female** students differs significantly ( α = .**05, two**-tailed) from the mean resting HR **( μ = 72**) for college-aged women. Find the **95% CI** for the population mean represented by Ihno’s female students. | | | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | **Sample Mean** | **95% CI**  (71.63, 72.91) | **Test value = 72**  t(99) = 24.744, p=.013 | **Ihno’s different?** | | FEMALE  Post-Quiz |  |  |  | 🞐 Different  🞐 Same | | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **7** | **A** | **\*7. One Sample: Confidence Interval for the Mean** | |
| In a study of a new treatment for phobia, the data for the experimental group were = 27 . 2 , = 4, and = 15. The data for the control group were = 34 . 4 , = 14, and = 15. | | | |
| 1. Calculate the **separate-variances** t value.   **experimental**  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  **control**  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  **SAMPLE DIFFERENCE**  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_  SE = \_\_\_\_\_\_\_\_\_\_\_\_    **H0 : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Ha : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **t( \_\_\_ ) = \_\_\_\_\_\_\_\_\_** | | | |
| 1. Calculate the **pooled-variance** t value.   **SAMPLE DIFFERENCE**  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_  SE = \_\_\_\_\_\_\_\_\_\_\_\_    **t( \_\_\_ ) = \_\_\_\_\_\_\_\_\_** | | | |
| **7** | **A** | **8. Experiment: true or quasi** | |
| 1. Design a **true experiment** involving two groups (i.e., the experimenter decides, at random, in which group each participant will be placed). | | | |
| 1. Design a **quasi-experiment** (i.e., an observational study) involving groups not created, but only selected, by the experimenter.   How are your **conclusions** from this experiment **limited**, even if the results are statistically significant? | | | |
| **7** | **B** | **\*3. Two Independent Sample Mean Difference: Hypothesis Test** | |
| On the first day of class, a third-grade teacher is told that **12 of his students are “gifted,”** as determined by IQ tests, and the **remaining 12 are not**. In reality, the two groups have been carefully matched on IQ and previous school performance.  At the end of the school year, the gifted students have a grade **average of 87.2** with **s = 5.3**, whereas the other students have an **average of 82.9,** with **s = 4.4**. | | | |
| http://www.psychstat.missouristate.edu/introbook/sbgraph/normal0.gifPerform a t test to decide whether you can conclude from these data that false expectations can affect student performance; use alpha = **.05, two**-tailed. **🡨 use separate variances (not pooled)**  **“gifted”**  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  **“not gifted”**  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  **SAMPLE DIFFERENCE**  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_  SE = \_\_\_\_\_\_\_\_\_\_\_\_    **H0 : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Ha : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **tCV = \_\_\_\_\_\_\_\_\_**  **t( \_\_\_ ) = \_\_\_\_\_\_\_\_\_**  **CONCLUSION:** | | | |
| **7** | **B** | **\*4. Two Independent Sample Mean Difference: Confidence Interval** | |
| A researcher tested the diastolic blood pressure of **60 marathon runners** and **60 nonrunners**. The **mean** for the runners was **75.9** mmHg with **s = 10**, and the **mean** for the nonrunners was **80.3** mmHg with s = **8**. | | | |
| **“runners”**  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  **“non-runner”**  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  **SAMPLE DIFFERENCE**  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_  SE = \_\_\_\_\_\_\_\_\_\_\_\_ | | | |
| 1. Find the 95% confidence interval for the difference of the population means.   **95% CI: ( \_\_\_\_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_\_\_ )**  **🡨 use separate variances (not pooled)** | | | |
| 1. Find the 99% confidence interval for the difference of the population means.   **99% CI: ( \_\_\_\_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_\_\_ )** | | | |
| 1. Use the confidence intervals you found in parts a and b to test the null hypothesis that running has no effect on blood pressure at the **.05 and .01** levels, **two** tailed.   **H0 : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Ha : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | | | |
| Alpha = .05  🞐 Runners are different  🞐 no difference | | | Alpha = .01  🞐 Runners are different  🞐 no difference |
| **7** | **B** | **6. Two Independent Sample Mean Difference: Hypothesis Test** | |
| A psychologist is studying the concentration of a certain enzyme in saliva as a possible indicator of chronic anxiety level.  A **sample of 12** anxiety neurotics yields a **mean** enzyme concentration of **3.2** with **s = .7**. For comparison purposes, a sample of **20 subjects** reporting low levels of anxiety is measured and yields a **mean** enzyme concentration of **2.3**, with **s = .4**. | | | |
| 1. http://www.psychstat.missouristate.edu/introbook/sbgraph/normal0.gifPerform a t test (alpha **= .05, two**-tailed) to determine whether the two populations sampled **differ** with respect to their mean saliva concentration of this enzyme. **🡨 use pooled variances (not separate)**   **“neurotics”**  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  **“low anx”**  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_  **SAMPLE DIFFERENCE**  \_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_  SE = \_\_\_\_\_\_\_\_\_\_\_\_    **H0 : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Ha : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **tCV = \_\_\_\_\_\_\_\_\_**  **t( \_\_\_ ) = \_\_\_\_\_\_\_\_\_**  **CONCLUSION:** | | | |
| 1. Based on your answer to part a, what **type of error** (Type I or Type II) might you be making?   🞐 Type I 🞐 Type II | | | |
| **7** | **C** | **1. Two Independent Sample Mean Difference: Hypothesis Test** | |
| Perform a two-sample t test to determine whether there is a statistically significant **difference** in **baseline heart rate** **between the men and the women** of Ihno’s class.  Type **R code** into Skeleton and Knit to get **pdf** including output | | | |
| Do you have homogeneity of variance? **Explain.**  🞐 yes  🞐 no | | | |
| Report your **results** as they might appear in a journal article.  Include the **95% CI** for this gender difference. | | | |
| **7** | **C** | **5. Two Independent Sample Mean Difference: Hypothesis Test** | |
| Perform a two-sample t test to determine whether **coffee drinkers** exhibited significantly higher **postquiz heart rates** than **nondrinkers** at the .05 level.  🞐 Coffee drinkers are different  **2-tail: p = \_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **t( \_\_\_ ) = \_\_\_\_\_\_\_\_\_**  🞐 no difference | | | |
| Is this t test significant at the **.01** level?  🞐 Coffee drinkers are different  🞐 no difference | | | |
| Find the **99%** CI for the **difference** of the two population means…  **99% CI: ( \_\_\_\_\_\_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_\_\_ )** | | | |
| … and explain its connection to your decision regarding the null hypothesis at the .01 level. | | | |
| **8** | **A** | **3. Cohen’s d** | |
| If the **mean** verbal SAT score is **510** for women and **490** for men, what is the **d** ? | | | |
| **d = \_\_\_\_\_\_\_\_\_** | | | |
| **8** | **A** | **9. Extremely large t-value** | |
| The **t value** calculated for a particular two group experiment was **− 23**. | | | |
| Which of the following can you conclude?  🞐 a. A calculation error must have been made.  🞐 b. The number of participants must have been large.  🞐 c. The effect size must have been large.  🞐 d. The expected t was probably large.  🞐 e. The alpha level was probably large. | | | |
| **Explain** your choice. | | | |
| **8** | **A** | **\*10. Cohen’s d** | |
| Suppose you are in a situation in which it is **more important to reduce Type II errors** than to worry about Type I errors. | | | |
| Which of the following could be helpful in reducing Type II errors?  🞐 a. Make alpha unusually large (e.g., .1).  🞐 b. Use a larger number of participants.  🞐 c. Try to increase the effect size.  🞐 d. All of the above.  🞐 e. None of the above. | | | |
| **Explain** your choice. | | | |
| **8** | **B** | **6. Power & Sample Size** | |
| A **drug** for treating headaches has a side effect of lowering diastolic blood pressure **by 8 mmHg** compared to a **placebo**. If the **population standard deviation** is known to be **6** mmHg, | | | |
| 1. What would be the **power** of an experiment ( α = .**01, two**-tailed) comparing the drug to a placebo using **15 participants per** group?   **power = \_\_\_\_\_\_\_\_\_** | | | |
| 1. How **many participants** would you need **per group** to attain **power = .95, with α = .01, two**-tailed?   **n = \_\_\_\_\_\_\_\_\_** | | | |
| **8** | **C** | **2. Power & Sample Size -- USE G\*Power SOFTWARE --** | |
| ~~Given the adjusted effect size from part a of the previous exercise,~~  **I am changing this problem!**  How many participants of each gender (assuming equal sample sizes) would be needed for power to be **.8**, with alpha = **.05, two**-tailed test? | | | |
| For a small effect size (d = .2)  **n = \_\_\_\_\_\_\_\_\_** | | | |
| For a medium effect size (d = .5)  **n = \_\_\_\_\_\_\_\_\_** | | | |
| For a large effect size (d = .8)  **n = \_\_\_\_\_\_\_\_\_** | | | |