PSTAT 5A / **FINAL EXAM** / Spring 2023   Instructor: **Ethan Marzban**

Name:_____   **UCSB NetID:**_____
      First, then Last   *NOT your Perm Number!*

Circle the section you <u>attend</u>:

Yuan 10 - 10:50am   Jason 11 - 11:50am   Nickolas 12 - 12:50pm   Nickolas 1 - 1:50pm

Your Seat Number:_____

SAMPLE MULTIPLE CHOICE QUESTIONS

Instructions:

- You will have **180 minutes** to complete the entire exam
  - Do not begin working on the exam until instructed to do so.
  - During the final 10 minutes of the exam, we will ask everyone to remain seated until the exam concludes.

- This exam comes in **TWO PARTS**: this is the **MULTIPLE CHOICE** part of the exam.
  - There is a separate booklet containing Free-Response questions that should have been distributed to you at the same time as this booklet.

- Fill in the bubble corresponding to your answer **on the provided scantron**; **Absolutely NOTHING** written directly on this exam booklet will be graded. Partial credit will **not** be awarded.
  - Unless explicitly instructed otherwise, mark only one answer per question. If you mark multiple answers for the same question, you will receive 0 points for the question even if one of your choices is correct.

- You are allowed the use of two **8.5 × 11-inch** sheets, front and back, of notes. You are also permitted the use of **calculators**; the use of any and all other electronic devices (laptops, cell phones, etc.) is prohibited.

- ☐ **PLEASE DO NOT DETACH ANY PAGES FROM THIS EXAM.**

- Good Luck!!!

Problem 1. What is the correct syntax to import the `scipy.stats` module with the nickname `sps`? [1pts.]

    A. `import scipy.stats with nickname sps`

    B. `import scipy.stats as sps`

    C. `import nickname(scipy.stats, sps)`

    D. `import module scipy.stats as nickname sps`

    E. None of the above

Problem 2. A hypothesis test has been conducted at a 5% level of significance. For which of the following $p-$values would we reject the null hypothesis in favor of the alternative? **Select ALL that apply;** incorrect choices incur a deduction of 0.5pts (capped out at zero; i.e. you will never receive negative points for this question.) [2pts.]

    A. 0.0100

    B. 0.0200

    C. 0.0600

    D. 0.0700

    E. 0.1000

Problem 3. If $X \sim \text{Bin}(10,\ 0.2)$, which of the following is the correct value of $\mathbb{P}(X = 3)$? [1pts.]

    A. 0.0000

    B. 0.2013

    C. 1.2649

    D. 2.0000

    E. None of the above.

Problem 4. A password is to be created using 3 letters, and 4 digits. Suppose the password must be of the form DLDLDLD (where "D" represents "digit" and "L" represents "letter"), and that the same letter/digit <u>can</u> be used more than once. How many passwords can be created using this scheme? [1pts.]

    A. 260

    B. 546,000

    C. 78,624,000

    D. 175,760,000

    E. None of the above.

Problems 5 - 8 refer to the following situation: An ANOVA (Analysis of Variance) has been performed on k groups. The resulting ANOVA table is shown below, but has certain entries redacted.

	DF	Sum Sq.	Mean Sq.	$F-$value	$\mathbb{P}(> F)$
Btwn. Grps.	7	35	5	\<blank2\>	0.435
Residuals	122	\<blank1\>	5		

Problem 5. What is k, the number of groups?   [1pts.]

    A. 5

    B. 6

    C. 7

    D. 8

    E. None of the above.

Problem 6. What is n, the total number of observations (aggregated across all groups)?   [1pts.]

    A. 122

    B. 123

    C. 129

    D. 130

    E. None of the above

Problem 7. What is the value of \<blank1\>?   [1pts.]

    A. 1.4000

    B. 24.4000

    C. 100.0000

    D. 610.0000

    E. None of the above

Problem 8. What is the value of \<blank2\>?   [1pts.]

    A. 1.0000

    B. 7.0000

    C. 9.0000

    D. 122.0000

    E. None of the above

Problems 9 - 11 refer to the following situation: A linear regression has been performed on two variables $x = \{x_i\}_{i=1}^{30}$ and $y = \{y_i\}_{i=1}^{30}$. (Assume y is the response variable and x is the explanatory variable.) The output is displayed in the following table, like the ones seen in Lecture 19:

	Estimate	Stnd. Error	$t-$value	$\mathbb{P}(> |t|)$
Intercept	0.3440	0.3068	1.121	0.272
Slope	2.7319	0.3177	8.598	2.42e-09

Problem 9. Which of the following correctly gives the equation of the OLS regression line?   [1pts.]

    A. $\hat{y} = 2.7319 + 0.3440 \cdot x$

    B. $\hat{y} = 0.3440 + 2.7319 \cdot x$

    C. $\hat{y} = 1.121 + 8.598 \cdot x$

    D. $\hat{y} = 8.598 + 1.121 \cdot x$

    E. None of the above.

Problem 10. Suppose it is known that the $x-$values were all between -2 and 2, respectively. If we tried to use the OLS regression line to predict the $y-$value associated with an $x-$value of 1 million, would this be an example of extrapolation?   [1pts.]

    A. Yes

    B. No

Problem 11. Which of the following correctly gives a 95% confidence interval for the slope of the true linear relationship between x and y, rounded to 4 decimal places?   [1pts.]

    A. $[7.9467 , 9.2493]$

    B. $[7.9499 , 9.2461]$

    C. $[8.1818 , 9.0142]$

    D. $[8.0579 , 9.1381]$

    E. None of the above

Problems 12 - 17 refer to the following situtation: A student wishes to write a function called `is_mult_of_three()` which is designed to take in a single input x and output:

- `True` if x is a multiple of 10
- `False` if x is not a multiple of 10
- `Error:  Input cannot be a string` if x is a string.

To that end, they have written the following skeleton code, but it is missing some crucial parts. (Assume this is the **only** code in the student's Jupyter Notebook, and that there are **no** other code cells before or after.

```
def is_mult_of_ten(  Blank 1  ):

    if (  Blank 2  (x) == str):

        return print("Error: input cannot be a string")

      Blank 3  :

        return (x   Blank 4   10   Blank 5  0)
```

Problem 12. What should go in Blank 1?   [1pts.]

    A. x

    B. y

    C. z

    D. w

    E. None of the above.

Problem 13. What should go in Blank 2?   [1pts.]

    A. data_type

    B. typeof

    C. type_of

    D. type

    E. None of the above.

Problem 14. What should go in Blank 3?   [1pts.]

    A. else

    B. else if

    C. elif

    D. e_if

    E. None of the above.

Problem 15. What should go in Blank 4?   [1pts.]

    A. `%%`

    B. `%`

    C. `mod`

    D. `||`

    E. None of the above.

Problem 16. What should go in Blank 5?   [1pts.]

    A. `==`

    B. `=`

    C. `!=`

    D. `=!`

    E. None of the above.

Problem 17. What is missing from the body of the student's function (specifically,   [1pts.]
this is something we mentioned in Lab that should *always* be included with a
function)

    A. An output statement

    B. A return statement

    C. An exception statement

    D. A docstring

    E. None of the above.