

Score: _____ / 15

PSTAT 5A / MIDTERM EXAM 1 / Sum. Sess. A 2023

Instructor: **Ethan Marzban**

Name: _____
First, then Last

UCSB NetID: _____
NOT your Perm Number!

Circle Your Section: Olivier 12:30 - 1:20pm Mengrui 2 - 2:50pm Mengrui 3 - 3:50pm

MULTIPLE CHOICE QUESTIONS VERSION A

Instructions:

- You will have **75 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.
 - The use of calculators is permitted; the use of any other aids (including notes, laptops, phones, etc.) is strictly prohibited. A list of formulae is included with this exam.
 - **PLEASE DO NOT DETACH ANY PAGES FROM THIS EXAM.**
 - Good Luck!!!
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Problem 1. Suppose that, in a particular Jupyter Notebook, the variable x has previously been defined. When evaluating the expression $x = x * 7$, which side of the equality does Python evaluate first? [1pts.]

- A. Left
- B. Right

Problem 2. A set of numbers $X = \{x_i\}_{i=1}^4$ is such that $\bar{x} = 3$. Define $Y = \{x_1, \dots, x_4, 3, 4\}$; that is, Y consists of the same numbers in X along with the numbers 3 and 4. What is \bar{y} , the mean of Y ? [1pts.]

- A. 1.6667
- B. 3.0000
- C. 3.1667
- D. 4.0000
- E. None of the above.

Problem 3. Let E be an event with $\mathbb{P}(E) = 0.1$. What is $\mathbb{P}(E \mid \emptyset)$, where \emptyset denotes the empty set? [1pts.]

- A. 0
- B. 1
- C. ∞
- D. Undefined
- E. None of the above.

Problem 4. Events A and B are such that $\mathbb{P}(A) = 0.5$, $\mathbb{P}(B) = 0.5$, and $\mathbb{P}(A \cap B) = 0.25$. Select the statement that is correct. [1pts.]

- A. A and B are independent, but not mutually exclusive
- B. A and B are mutually exclusive, but not independent
- C. A and B are both mutually exclusive and independent
- D. A and B are neither mutually exclusive nor independent

Problem 5. A *GachoLotto* ticket number consists of 2 Letters ($A - Z$) and 1 digit ($0 - 9$), in any order. For example, A3A is a valid *GachoLotto* ticker number. Assuming repeated digits are allowed, what is the total number of *GachoLotto* tickets that can be created? [1pts.]

- A. 6,500
- B. 6,760
- C. 39,000
- D. 40,560
- E. None of the above

Problems 6 - 10 refer to the following: Consider the following data matrix:

color	height	weight	grade
red	2.1	3.2	A+
red	3.3	4.1	B-
orange	1.1	2.2	A-
blue	4.4	5.7	C
orange	2.3	2.9	A

- Problem 6.** How many observational units are present in this data matrix? [1pts.]
- A. 4
 - B. 5
 - C. 6
 - D. 7
 - E. None of the above.
- Problem 7.** What is the correct classification of the `color` variable? [1pts.]
- A. Discrete
 - B. Continuous
 - C. Ordinal
 - D. Nominal
- Problem 8.** What type of visualization is best suited for the `grade` variable? [1pts.]
- A. Barplot/Bargraph
 - B. Boxplot
 - C. Histogram
 - D. Scatterplot
 - E. None of the above.
- Problem 9.** What type of visualization is best suited to visualize the relationship between the variables `height` and `grade`? [1pts.]
- A. Histogram
 - B. Scatterplot
 - C. Side-by-side Boxplot
 - D. Line Graph
 - E. None of the above.
- Problem 10.** Crucially, this data set is missing a description of what the variables represent. What is such a description called? [1pts.]
- A. Data Descriptor
 - B. Data Matirx Supplement
 - C. Data Dictionary
 - D. Data Science
 - E. None of the above.

Problems 11 - 15 refer to the following situation: Katrina would like to write a function called `length_classifier()` that takes in a single list $x = [x_1, x_2, \dots, x_n]$. The function is meant to output one of three things:

- If x has 3 or fewer elements, the function should output the string "short"
- If x has between 4 and 7 elements (inclusive on both ends), the function should output the string "medium"
- If x has 8 or more elements, the function should output the string "long"

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

```
def length_classifier(x):
    if len(x) Blank 1 3:
        return "short"
    Blank 2 4 Blank 3 len(x) Blank 4 8:
        return "medium"
    else:
        return "long"
```

Problem 11. What should go in Blank 1?

[1pts.]

- A. <
- B. <=
- C. >
- D. >=
- E. None of the above.

Problem 12. What should go in Blank 2?

[1pts.]

- A. `else`
- B. `else if`
- C. `elif`
- D. `e_if`
- E. None of the above.

Problem 13. What should go in Blank 3?

[1pts.]

- A. <
- B. <=
- C. >
- D. >=
- E. None of the above.

Problem 14. What should go in Blank 4?

[1pts.]

- A. <
- B. <=
- C. >
- D. >=
- E. None of the above.

Problem 15. What is missing from the body of Katrina's function (specifically, this is something we mentioned in Lab that should *always* be included with a function)

[1pts.]

- A. An output statement
- B. A return statement
- C. An exception statement
- D. A docstring
- E. None of the above.

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