

Score: \_\_\_\_\_ / 15

PSTAT 5A / MIDTERM EXAM 2 / 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 B

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### 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, as well as a collection of tables, is included with this exam.
  - **PLEASE DO NOT DETACH ANY PAGES FROM THIS EXAM.**
  - Good Luck!!!
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**Problems 1 - 4 refer to the following situation:** Suppose that Mehr has imported the `scipy.stats` module with the nickname `sps`, and also imported the `numpy` module with the nickname `np`.

**Problem 1.** Approximately what value would be returned by the running the command `sps.norm.ppf(0.0351)`? [1pts.]

- A. -1.81
- B. -2.11
- C. 1.81
- D. 2.11
- E. None of the above

**Problem 2.** Approximately what value would be returned by the running the command `sps.t.cdf(1.33, df = 20)`? [1pts.]

- A. 0.010
- B. 0.100
- C. 0.200
- D. 1.330
- E. None of the above

**Problem 3.** Suppose Mehr runs the command [1pts.]

```
np.random.choice(np.arange(7), size = 10)
```

Which of the following best describes what this code is doing?

- A. Simulates rolling a 7-sided die once
- B. Simulates rolling a 6-sided die once
- C. Simulates rolling a 10-sided die 7 times
- D. Simulates rolling a 6-sided 10 times
- E. None of the above

**Problem 4.** Suppose Mehr now runs the following lines of code: [1pts.]

```
a = sps.norm.ppf(0.1)
b = sps.norm.ppf(0.9)
```

Which of the following correctly describes the relationship between the values of `a` and `b`?

- A.  $a = 1 - b$
- B.  $b = 1 - a$
- C.  $a = -b$
- D.  $a + b = 1$
- E. None of the above.

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**Problems 5 - 7 refer to the following situation:** Consider the random variable  $X$  with the following probability mass function (p.m.f.):

$k$	-1	0	1	2
$\mathbb{P}(X = k)$	0.2	0.5	0.05	$a$

for some as-of-yet unknown constant  $a$ .

**Problem 5.** What must be the value of  $a$ ?

[1pts.]

- A. 0.15
- B. 0.25
- C. 0.50
- D. 0.75
- E. None of the above

**Problem 6.** Suppose  $a = 0.25$  (which is not to say this is the correct answer to Problem 9 above!) What is the value of  $\mathbb{E}[X]$ , the expected value of  $X$ ?

[1pts.]

- A. 0.05
- B. 0.15
- C. 0.25
- D. 0.35
- E. None of the above

**Problem 7.** Suppose  $a = 0.25$  (which is not to say this is the correct answer to Problem 9 above!) and that  $\mathbb{E}[X] = 0.35$  (which is not to say this is the correct answer to Problem 10 above!) What is  $\text{Var}(X)$ ?

[1pts.]

- A. 1.1275
  - B. 1.2500
  - C. 1.3725
  - D. 1.6000
  - E. None of the above
- .....

**Problems 8 - 11 refer to the following situation:** Alan would like to plot the function  $f(x) = xe^{-x^2}$ , between  $x = 0$  and  $x = \pi$ . To that end, he has written the following code, and has nothing written before it:

```

%matplotlib inline
import matplotlib
import matplotlib.pyplot as Blank 1
plt.style.use('seaborn-v0_8-whitegrid')

Blank 2 numpy Blank 3 np

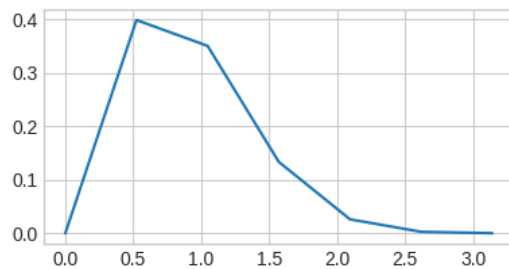
def f(x):
    """
    return x * e^(-x^2)
    """
    return x * np.exp(- (x ** 2))

xnew = np.linspace(0, np.pi, 7)
plt.plot(xnew, f(xnew));

```

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This code, after filling in the blanks appropriately, has resulted in the following output:



**Problem 8.** What should go in Blank 1?

[1pts.]

- A. matplotlib.pyplot
- B. pyplot
- C. plt
- D. mtpltlbpplt
- E. None of the above

**Problem 9.** What should go in Blank 2?

[1pts.]

- A. import
- B. load
- C. store\_module
- D. \*
- E. None of the above

**Problem 10.** What should go in Blank 3?

[1pts.]

- A. `*`
- B. `as`
- C. `if`
- D. `elif`
- E. None of the above

**Problem 11.** Note that the resulting plot is quite “jagged.” Alan would like to fix that, and make the resulting plot smoother without changing the  $x$ - and  $y$ -limits of the plot. Which of the following will achieve that?

[1pts.]

- A. Change the `np.pi` in his call to `np.linspace()` to a larger number; e.g. 100.
  - B. Change the 0 in his call to `np.linspace()` to a larger number; e.g. 100.
  - C. Change the 7 in his call to `np.linspace()` to a larger number; e.g. 100.
  - D. None of the above
- .....

**Problems 12 - 15 refer to the following situation:** Shivani would like to write a function called `num_even()` that takes in a single list input `x` and returns the number of even elements in `x`. She has written the following skeleton code (assume she has nothing written before this code):

```
def num_even(x):

    """
    return the number of even elements in a list x
    """

    count = Blank 1

    for k in x:

        if Blank 2 % 2 == 0:

            Blank 3 += 1

        else:

            count += 0

    return Blank 4
```

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**Problem 12.** What should go in Blank 1?

[1pts.]

- A. 0
- B. 1
- C. 2
- D. 3
- E. None of the above

**Problem 13.** What should go in Blank 2?

[1pts.]

- A. x
- B. k
- C. count
- D. even\_count
- E. None of the above

**Problem 14.** What should go in Blank 3?

[1pts.]

- A. x
- B. k
- C. count
- D. even\_count
- E. None of the above

**Problem 15.** What should go in Blank 4?

[1pts.]

- A. x
- B. k
- C. count
- D. even\_count
- E. None of the above

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