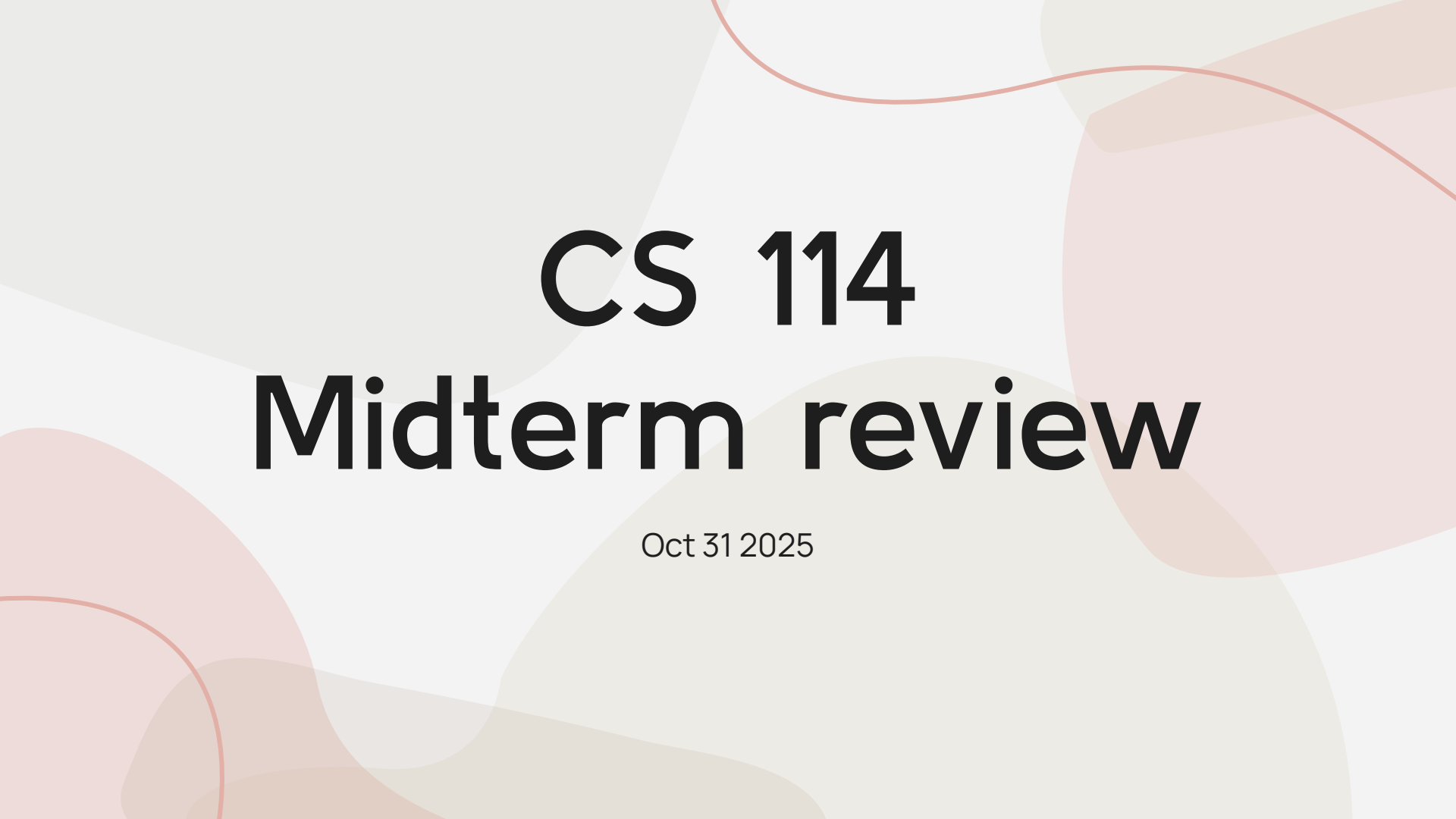




CS 114

Midterm review

Oct 31 2025

Midterm Topics

- ❑ Module 1: Functions
- ❑ Module 2: Conditionals (if, else, and, or, True, False, ==)
- ❑ Module 3: Loops (for, while)
- ❑ Module 4: Strings & Lists
- ❑ Module 5: Sorting & Dictionaries (.sort, sorted)
- ❑ Module 6: Files (text, CSV)
- ❑ Module 7: Numpy & Plotting
- ❑ Style (docstrings, annotations, asserts)

Midterm date: Monday Nov. 3, 7:00pm-8:50 pm

Module 7: Numpy & Plotting

```
np.array([1, 2, 3 ...])
```

```
Annotation: npt.NDArray[np.int64]
```

Operations on two arrays performs the operation one by one between items

Operations on a whole array performs the operation on each item

Vectorize to perform a conditional function on each element of the array

```
Import matplotlib.pyplot as plt
```

```
plt.plot(x_list, y_list, 'colour_marker')
```

```
plt.xlabel = "x axis"
```

```
plt.show()
```

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Functions

```
def my_func(a: int, b: int, c: int) -> int:  
    sum = a + b + c  
    a = 0  
    add = sum  
    add += 1  
    return sum  
  
print(my_func(3,4,5))
```

What does this code print?

- A. 9 B. 12 C. 13 D. nothing, error occurs



Conditionals

```
my_grade = 63
failed = not(my_grade >= 50)

if failed and my_grade > 40:
    print("close to pass")
elif failed:
    print("failed")
elif not(failed) and my_grade < 80:
    print("passed")
else:
    print("close to 100!")
```

What does this program print?

- A. close to pass B. failed C. passed D. close to 100!



For Loops

```
sum = 0
for counter in range (1,7,2):
    sum = sum + counter
print (sum)
```

What will sum be after running?

A. 21

B. 16

C. 8

D. 9



Lists

```
x = ["a", "b", "c", ("d", "e"), ["f", "g", "h"]]  
print(x[-3])
```

What letter will be printed?

A.

“c”

B.

“d”

C.

“e”

D.

“f”



Sorting & Dictionaries

```
dictionary = {10400: "hi", 758: "yay", 8926: "abc"}  
print(sorted(dictionary))
```

What will the above code print?

- A. A list of the sorted keys
- B. A list of the sorted values
- C. A tuple with the sorted keys and values
- D. Nothing, sorted doesn't work on dictionaries



CSV Files

```
with open("data.csv") as f:  
    rdr = csv.DictReader(f)  
    for row in rdr:  
        print(row)
```

```
Name,Score  
Alice,90  
Bob,85
```

What will the first print row look like?

- A. ["Name", "Score"]
- B. ["Alice", "90"]
- C. {'Name': 'Alice', 'Score': '90'}
- D. {'Alice': 'Name', '90': 'Score'}

Answer: C



Numpy

```
def f(x):  
    if x % 2 == 0:  
        return True  
    else:  
        return False
```

```
x = np.array([1, 2, 3, 4])  
vectorized = np.vectorize(f)  
y = vectorized(x)
```

What will the np.array y have within it?

- A. [1, 2, 3, 4]
- B. [1.0, 2.0, 3.0, 4.0]
- C. [True, False, True, False]
- D. [False, True, False, True]



Plot

```
import matplotlib.pyplot as plt

plt.plot([2, 4, 6, 8])
plt.title("Example Plot")
plt.xlabel("X")
plt.ylabel("Y")
```

Which of the following is true?

- A. The x-values are [1, 2, 3, 4], and y-values are [2, 4, 6, 8].
- B. The x-values are [0, 1, 2, 3], and y-values are [2, 4, 6, 8].
- C. The x-values and y-values are both [2, 4, 6, 8].
- D. Matplotlib cannot plot because x-values are missing.

The following code is meant to find the highest score from a list and print it in a message. There are a total of 7 errors. Debug this code writing out both the errors and a corrected solution. Try this on paper for the midterm!

```
def find_max(scores):  
    max = 1  
    for s in range(scores):  
        if s > max:  
            max = scores  
    return max  
  
scores = [90, 83, 85, 96, 82, 71]  
find_max(scores)  
print("the highest score is: " max)
```

```
def find_max(scores):  
    max = 1  
    for s in range(scores):  
        if s > max:  
            max = scores  
    return max  
  
scores = [90, 83, 85, 96, 82, 71]  
find_max(scores)  
print("the highest score is: " max)
```

Max should be first
item in scores

Should loop through
scores itself

Scores is the list not
the value

Early return

Does not store the
maximum

Max variable only
exists in function

Solutions found in
Jupyter Notebook

Missing comma

Given the function $f(x) = x^2 + 2x + 1$, use numpy linspace and vectorize to complete the following:

1. Create 100 equally spaced x values in the range $[0, 5]$
2. Define the function $f(x)$ that will compute $x^2 + 2x + 1$
3. Use `np.vectorize` to apply f to each value (create y values)
4. Approximate the average over the range using the following formula:

$$\text{Average} \approx \left[\sum f(x_i) \Delta x \right] / (b - a)$$

Notes: $[a, b]$ is the range of the function

Δx is the interval between x values

Σ is a sum

$f(x_i)$ means each $f(x)$ value

Solutions found in
Jupyter Notebook

Extra Practice - Try these on paper

Write a function that takes a dictionary of type `dict[str, int]` and creates a new dictionary sorted by the keys in alphabetical order.

Write a function that sorts a list of numbers from highest to lowest with mutation. Write annotations, a docstring, and tests for this function.

Write a function that prints the first word from each line of a text file.

Write a function that opens the CSV file as a dictionary and add all the values under a given key. Assert that the given key is in the file's header.

`annotateMe = ({1: "hi"}, 7.0)`

How would you access the word "hi"?

`Indexing = ("four", "me", ["you"]), {3: "see", 9: "hello", 10: "hi"}, "same")`

Solutions found in
Jupyter Notebook