

Computer Science 217

Midterm Exam #2

Spring 2025

June 5, 2025

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First Name: _____

Last Name: _____

ID: _____

Instructions:

- Neatly print your names and ID number in the spaces above.
- Neatly print your names and ID number on both bubble sheets.
- Shade the circles for your ID number on both bubble sheets.
- Record your answer for question 1 on the appropriate bubble sheet. Record your answers for questions 2 to 19 on the traditional five-answer multiple-choice bubble sheet.
- Ensure that any errors made when recording answers on the bubble sheets are erased completely. Replacement bubble sheets are available if you are unable to completely erase your undesired response.
- Pick the **best answer** for each multiple-choice question.
- This exam consists of 8 pages, including the cover. Before answering any questions, count the pages and ensure that they are all present.
- You have 60 minutes to complete this exam. Extra time will not be provided to record your answers on the bubble sheets. Ensure that all of your answers have been recorded before the time limit is reached.
- Unless noted otherwise, each question is worth one mark.
- This exam is closed book. You are not permitted to use any electronic devices or reference materials.
- **DO NOT TURN PAST THIS PAGE UNTIL YOU ARE INSTRUCTED TO BEGIN.**

Record the answers to the questions on this page on the provided bubble sheet.
Answers recorded in this question booklet will NOT be graded.

1. [12 marks] Consider a video game character that begins at position (0, 0) in their coordinate system. The character can move up (which increases their y position by 1), down (which reduces their y position by 1), right (which increases their x position by 1) and left (which decreases their x position by 1). The steps taken by the character are stored in a list of strings, where every element in the list is either "up", "down", "left" or "right". (You don't need to consider the possibility that an invalid value might be present in the list).

Write a function named `sameLocation` that takes a list of steps as its only argument. The function should examine the list and determine whether or not the sequence of steps ever causes the character to visit the same location twice. If so, the function should return `True`. Otherwise, it should return `False`.

Hint: To perform this task, your function should start the character at 0,0, and then consider each step in sequence and update the player's location (represented by the variables `x` and `y`) appropriately. If that `x, y` location has already been visited, then your function should immediately return `True`. Otherwise, your function should add the current location to the list of positions that have already been visited and go on and process any remaining steps.

Only write the function described in this question. Do **not** write a main program that attempts to use the function.

Example function calls and their expected results are shown below.

- `sameLocation([])` should return `False` (because the character doesn't move)
- `sameLocation(["up"])` should return `False` (because the character starts at 0,0 and moves to 0,1)
- `sameLocation(["up", "up"])` should return `False` (because the character starts at 0,0, moves to 0,1, and then moves to 0,2)
- `sameLocation(["up", "down"])` should return `True` (because the character moves up to 0,1, and then returns to 0,0, which is where they started)
- `sameLocation(["up", "down", "right"])` should return `True` (because the character moved up to 0,1, but then returned to 0,0 where they started, before moving to the right)
- `sameLocation(["left", "up", "down", "down"])` should return `True` (because they were at -1,0 after both their first and third steps)
- `sameLocation(["down", "down", "right", "up", "left", "left", "left"])` should return `True` (because the character is at 0,-1 after the first move and after the fifth move)

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Use the following lines to construct your solution. Record your answer onto the provided bubble sheet. Ensure that you follow the dashed vertical lines for any indented statements and that you shade the digits associated with each statement that you use. Statements can be used more than once. Some statements may not be needed. Any lines on the bubble sheet where a statement number is not shaded will be ignored.

```
1: def sameLocation()  
3: def sameLocation(steps):  
5: elif step == "down":  
7: elif step == "right":  
9: else:  
12: for step in steps:  
14: if [x, y] in visited:  
16: if step == "up":  
18: return 0  
23: return False  
25: return True  
27: visited = []  
29: visited.append([x, y])  
34: while step in steps:  
36: x = 0  
38: x = 1  
45: x = x + 1  
47: x = x - 1  
49: y = 0  
56: y = 1  
58: y = y + 1  
67: y = y - 1
```

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2. Consider the following code segment:

```
a = -1
while a < 6:
    print("X")
    if a == 3:
        a = a - 1
    elif a == 5:
        a = a - 2
    a = a + 2
```

How many copies of the letter X are displayed when it executes?

- A. 2
 - B. 3
 - C. 4
 - D. 5
 - E. 6
3. Which of the following statements is most correct?
- A. The number of times that a while loop body will execute must be known before the loop's body executes for the first time.
 - B. For loops can be used for both counting up and for counting down.
 - C. A loop that never terminates is referred to as an infinite loop.
 - D. Exactly two of the above answers are correct.
 - E. Answers A, B and C are all correct.

4. Consider the following code segment:

```
p = 1
for i in range(1, 6):
    p = p * 2
print(p)
```

What value is printed when it executes?

- A. 1
 - B. 10
 - C. 12
 - D. 32
 - E. 64
5. Which of the following statements is most correct?
- A. A while loop can be nested inside another while loop
 - B. A for loop can be nested inside a while loop
 - C. A while loop can be nested inside a for loop
 - D. Exactly two of the above statements are correct
 - E. Answers A, B and C are all correct

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6. Consider the following code segment:

```
for i in range(5, 0):  
    print("Z")
```

It is supposed to display 5 copies of the letter Z, but when it is executed, no output is generated. What change(s) must be made so that the program will display its intended result?

- A. Insert a new line with `i = 5` on it ahead of the loop
 - B. Replace `range(5, 0)` with `range(5, 0, -1)`
 - C. Replace `print("Z")` with `print(Z)`
 - D. Exactly two of the above changes must be performed to correct the program
 - E. Changes A, B and C must all be performed to correct the program
7. What is the value of `z` after the following code segment executes?

```
z = 0  
  
for i in range(1, 3):  
    for j in range(3, 7, 2):  
        z = z + 1
```

- A. 4
 - B. 6
 - C. 8
 - D. 9
 - E. 12
8. Which of the following problems would not be well suited to a nested loop?
- A. Constructing a square game board where each location on the board is assigned a random integer
 - B. Converting an image from color to grayscale
 - C. Displaying a multiplication table that shows the products of all combinations of integers from 1 times 1 to 10 times 10
 - D. Drawing a target that consists of alternating red and white rings
 - E. Drawing an 8 by 8 checkerboard with alternating black and white squares
9. What are the functions in the following code segment?

```
i = int(input("Enter an integer: "))  
  
for i in range(i):  
    print(i)
```

- A. `for`, `i`, `in`, `input`, `in`, `print`, `range`
- B. `for`, `in`
- C. `for`, `in`, `input`, `int`, `print`, `range`
- D. `i`, `input`, `int`, `print`, `range`
- E. `input`, `int`, `print`, `range`

10. Consider the following code segment:

```
def adder(a, b):  
    return total  
    total = a + b  
  
i = int(input("Enter an integer: "))  
j = int(input("Enter an integer: "))  
  
result = adder(i, j)  
print("The sum is", result)
```

What is displayed when this code segment is executed, and the user enters 5 for a and 10 for b?

- A. The sum is 0
 - B. The sum is 5
 - C. The sum is 10
 - D. The sum is 15
 - E. None of the above answers is correct
11. Which of the following statements is most correct?
- A. A function that does not include a return statement must print a value on the screen.
 - B. A function's body may consist of only one statement.
 - C. A parameter variable cannot appear on the left side of an assignment statement.
 - D. Every function body must include a return statement.
 - E. Only Boolean values, floating-point values, integers, and strings can be passed to a function.

12. Consider the following code segment:

```
def grd(s, e):  
    return e - s  
  
def gtd(s, d, e):  
    rd = grd(s, e)  
    return d + rd  
  
td = gtd(4, 3, 7)  
print(td)
```

What is printed when it executes?

- A. 1
- B. 3
- C. 4
- D. 6
- E. 7

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13. Consider the following code segment:

```
def f(a):  
    return 2 * a  
  
def g(a):  
    return 3 * a  
  
def h(a, b):  
    i = f(a) + g(b)  
    return i  
  
q = h(2, 3)  
print(q)
```

What value does it display?

- A. 4
 - B. 9
 - C. 13
 - D. 18
 - E. 26
14. Which of the following statements is most correct?
- A. A list is a data structure that always stores one or more elements.
 - B. An element can be removed from the beginning of a list using the pop method.
 - C. An empty list is denoted by {}.
 - D. Every element stored in a list must be a unique integer.
 - E. Elements can only be added to the end of a list.
15. Consider a list, chars, that currently holds ["B", "o", "b"]. Which statement will update the list so that it holds ["B", "o", "b", "I"]?
- A. chars = chars + "I"
 - B. chars[3] = "I"
 - C. chars.append("I")
 - D. chars.insert("I")
 - E. None of the above answers is correct
16. Which operator / method / function is used to check whether or not a particular value is present in a list, resulting in True if it is, and False otherwise?
- A. at
 - B. in
 - C. index
 - D. pos
 - E. where

17. Consider the following code segment.

```
i = 0                # line 1
while i <= len(data): # line 2
    print(data[i])    # line 3
    i = i + 1         # line 4
```

It is supposed to print out all of the values in the list stored in data in sequence, with one value appearing on each line, but when it runs it displays the values as expected and then crashes with a list index out of range error. What change needs to be made to eliminate the error?

- A. Initialize i to 1 on line 1
- B. Replace <= with < on line 2
- C. Replace data[i] with data[i-1] on line 3
- D. Replace i = i + 1 with i = i - 1 on line 4
- E. Swap the order of lines 3 and 4 so that i is increased before the value is printed

18. Consider the following code segment:

```
data = [12, 7, 19]
for i in range(1, len(data)):
    data[i - 1] = data[i]

print(data)
```

What is printed when it executes?

- A. [7, 19, 19]
- B. [12, 7, 19]
- C. [12, 12, 7]
- D. [12, 19, 19]
- E. None of the above answers is correct

19. Consider the following code segment:

```
data = [[32, 16], [1, 9, 5], [6]]
data[1].append(2)
```

What is stored in data once it finishes executing?

- A. [[2], [32, 16], [1, 9, 5], [6]]
- B. [[32, 16, 2], [1, 9, 5], [6]]
- C. [[32, 16], [1, 9, 5, 2], [6]]
- D. [[32, 16], [1, 9, 5], [6, 2]]
- E. [[32, 16], [1, 9, 5], [6], [2]]