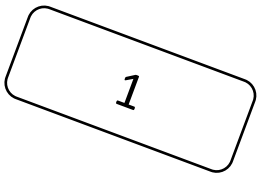
# Computer Science 217




## Midterm Exam #1

## L02 / L03 (Morning)

## February 25, 2025

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 of the provided bubble sheets, and shade the circles for your ID number on both of the answer sheets.
- Record your answer for question 1 on the appropriate bubble sheet. Record your answers for questions 2 to 21 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 400 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.**

Questions related to the content of this exam will not be answered during the exam. If you believe that a question contains an error, or is otherwise problematic, write a description of the error next to the question in this exam book and shade the box below. Only shade the box if you have encountered a question with an error or problem.

An error or problem was encountered that needs to be addressed: ☐

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

Question #1:

[12 marks] In a particular board game, one of the ways that players score points is by connecting two cities with playing pieces that are trains. The number of points awarded depends on the length of the route between the cities, as described below:

- One or two trains: The number of points awarded is equal to the number of trains played
- Three trains: Four points are awarded
- Four trains: Seven points are awarded

There are no routes that use fewer than one train or more than four trains.

Create a program that helps players compute their total score in the game. The user will enter the length of each route that they have completed, and the appropriate number of points will be added to their score. The total number of trains used should also be recorded. The program will continue reading route lengths until a negative value is entered.

If the user enters a route length that is a non-negative integer other than 1, 2, 3 or 4, then an error message should be displayed, but the program should go on and read and process additional inputs from the user until a negative number is entered. When the user enters a negative number, the program will display the total score and the number of trains played, before the program exits.

All of the values entered by the user will be integers. You do not need to consider or respond to other input values.

Sample input and output is shown below. The values that were entered by the user are shown in bold.

```
How many trains? 1
How many trains? -1
You played 1 train(s) to earn 1 point(s).
```

Additional sample input and output is shown below:

```
How many trains? 2
How many trains? 4
How many trains? 2
How many trains? 2
How many trains? 4
How many trains? -4
You played 14 train(s) to earn 20 point(s).
```

An example that includes some invalid input values is shown below:

```
How many trains? 0
That wasn't a valid number of trains.
How many trains? 3
How many trains? 17
That wasn't a valid number of trains.
How many trains? -16
You played 3 train(s) to earn 4 point(s).
```

The statements needed to solve this problem can be found on the next page.

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

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 blank lines on the bubble sheet will be ignored.

```
 1:  elif num_trains == 3:
 3:  elif num_trains > 3:
 5:  elif num_trains == 4:
 7:  elif num_trains > 4:
 9:  else:
12:  if num_trains == 1 and num_trains == 2:
14:  if num_trains == 1 or num_trains == 2:
16:  num_trains = input("How many trains? ")
18:  num_trains = int(input("How many trains? "))
23:  num_trains = int(line)
25:  points = 0
27:  points = points + 1
29:  points = points + 4
34:  points = points + 7
36:  points = points + num_trains
38:  print("That wasn't a valid number of trains.")
45:  print("You played %d train(s) to earn %d point(s)." % (total_trains, points))
47:  total_trains = 0
49:  total_trains = total_trains + 1
56:  total_trains = total_trains + num_trains
58:  while num_trains >= 0:
67:  while num_trains < 0:
```

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

2. Which of the following is **not** an example of an electric or electronic switch that can be used to build a computer?
   A. Inductor
   B. Relay
   C. Transistor
   D. Vacuum tube
   E. None of the above answers are correct (all are examples of switches that can be used)

3. Which of the following statements is most correct?
   A. Gordon Moore predicted that complexity for minimum component cost would double each year for at least 10 years.
   B. Moore's law was originally stated when ENIAC was completed in 1945.
   C. The doubling predicted by Moore's law remained in effect for 20 years before it stopped.
   D. Exactly two of the above answers are correct.
   E. Answers A, B and C are all correct.

4. Which of the following statements is most correct?
   A. A computer that performs addition more quickly and accurately than a person is an example of artificial intelligence.
   B. Complexity theory is one of the two major subfields of information security.
   C. Deadlock and race conditions are important considerations when building a distributed system.
   D. Improving a program's user interface is the primary goal of software engineering.
   E. The seam carving algorithm was developed to securely transfer data over an insecure network.

5. Which of the following is **not** an example of an algorithm?
   A. A list of steps for opening a combination lock
   B. A recipe for making pancakes
   C. Assembly instructions for a bookshelf
   D. Pictures that show the folds needed to transform a piece of paper into a paper crane
   E. The phone number for technical support

6. Which of the following statements is **not** correct?
   A. It is reasonably easy to find and fix errors in Python programs (compared to many other programming languages).
   B. Python is a relatively straightforward to learn (compared to many other programming languages).
   C. Python is primarily used in academia. It is rarely used in industry.
   D. Python is sufficiently powerful to solve interesting problems.
   E. Python programs can be created on computers running Windows, MacOS and Linux.

7. Which of the following sequences of characters is a valid / legal variable name in a Python program?
   A. 7a
   B. _3
   C. x
   D. Exactly two of the above answers are correct.
   E. Answers A, B and C are all correct.

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

8. Which of the following statements is most correct about errors in Python programs?
   A. An error message will be displayed if there is a logic error present anywhere in a program.
   B. An error message will be displayed if there is a syntax error present anywhere in a program.
   C. Logic errors are typically the easiest type of error to locate and correct.
   D. Syntax errors are typically the most difficult type of error to locate and correct.
   E. None of the above statements is correct.

9. Consider the following code segment:

```
x = input("Enter x: ")
y = int(input("Enter y: "))
z = x * y
print("z is", z)
```

   What will be displayed if the user enters 8 for x and 5 for y?
   A. z is 5
   B. z is 8
   C. z is 40
   D. z is 88888
   E. z is 55555555

10. Which of the following is the best definition for data?
    A. A numeric value stored in a computer
    B. A sequence of bits that represents an integer or a character
    C. A value without context or meaning
    D. Knowledge obtained from investigation, study or instruction
    E. The state of being of an object or system of interest

11. When counting in hexadecimal, the integer immediately after $F_{16}$ is:
    A. $0_{16}$
    B. $A_{16}$
    C. $G_{16}$
    D. $10_{16}$
    E. $FF_{16}$

12. What is 123 base 7 equal to in base 10?
    A. $66_{10}$
    B. $72_{10}$
    C. $108_{10}$
    D. $156_{10}$
    E. $162_{10}$

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

13. What is 83 base 10 equal to in base 12?
    A. $6B_{12}$
    B. $B6_{12}$
    C. $116_{12}$
    D. $611_{12}$
    E. $B16_{12}$

14. What type of information is often encoded using three 8-bit quantities?
    A. ASCII Characters
    B. Colors
    C. Floating-point numbers
    D. Images
    E. Integers

15. Consider the following truth table.

| x | y | Column A | Column B | Column C | Column D | Column E |
|---|---|---|---|---|---|---|
| False | False | False | False | True | True | True |
| False | True | True | False | True | False | True |
| True | False | True | False | False | False | True |
| True | True | False | True | True | False | False |

    Which column shows the correct combination of True and False values for the expression not x or y?
    A. Column A
    B. Column B
    C. Column C
    D. Column D
    E. Column E

16. Consider the following program:

```
n = float(input("Enter n: "))

if n <= 0:
  print("X")
if n >= 0:
  print("Y")
```

Which of the following statements is most correct if the user enters 0 for n?
    A. The program doesn't display any output.
    B. The program displays only X.
    C. The program displays only Y.
    D. The program displays X followed by Y.
    E. The program displays Y followed by X.

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

17. Consider the following program:

```
x = int(input("Enter x: "))
y = int(input("Enter y: "))

if x > 1:
  if y > 0:
    print("A")
    y = y + 1
  print("B")
  if y > 1:
    print("C")
    x = x - 4
elif x < 0:
  print("D")
```

What letter(s) is/are displayed when the user enters 2 for x and 1 for y?

A. B
B. A and B
C. A and C
D. A, B and C
E. A, B, C and D

18. Consider the following statement:

    x = 2 ** 4 >= 10 % 3

    What value is stored in x when it executes?

A. 1
B. 3
C. 16
D. False
E. True

19. Which of the following statements is most correct?

A. Blackbox testing is predominantly structural.
B. If statement level test coverage is achieved, then a program is guaranteed to be bug-free.
C. Testing can only be used to demonstrate the presence of bugs; it cannot prove their absence.
D. Whitebox testing is predominantly functional / behavioural.
E. More than one of the above statements is correct.

20. Which of the following statements is most correct?

A. A loop that never terminates is referred to as a boundless loop
B. A while loop is an example of a post-tested loop
C. The condition on a while loop must include a relational operator
D. More than one of the above statements is correct
E. None of the above statements is correct

21. Consider the following program:

```
x = int(input("Enter an integer: "))
while x != 0:
  print(x)
  x = x - 2
```

What numbers are displayed if the user enters 6 when it executes?

A. 4, 2
B. 4, 2, 0
C. 4, 2, 0, -2
D. 6, 4, 2
E. 6, 4, 2, 0