Computer Science 217

Midterm Exam

May 30, 2024

First Name: _____

Last Name: _____

ID: _____

Instructions:

- Neatly print your names and ID number in the spaces provided above.
- Neatly print your names and ID on both of the provided answer sheets, and shade the circles for your student ID number on both of the answer sheets.
- Record your answers for question 1 on the appropriate bubble sheet. Record your answers for questions 2 to 31 on the traditional 5 answer multiple choice bubble sheet.
- Ensure that any errors made when recording answers on the bubble sheets are erased completely. Additional 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 10 pages, including the cover. Before answering any questions count the pages and ensure that they are all present.
- You have 1 hour 15 minutes to complete this exam. Extra time will **not** be provided to record your answers on the answer 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.**

Answer the questions on this page on the provided answer sheet.
Answers recorded in this exam booklet will NOT be graded.

Question #1:

[12 marks] Directions can be specified using headings. A heading is an angle that ranges from 0 degrees to 360 degrees, with 0 degrees (or 360 degrees) denoting true north, 90 degrees denoting true east, 180 degrees denoting true south, and 270 degrees denoting true west.

While headings are helpful for providing precise directions, compass directions (north, south, east and west) are more commonly used in casual conversations where the level of precision of a particular heading is not required. For the purposes of this exercise any heading between 45 and 135 degrees will represent east, any heading between 135 and 225 degrees will represent south, and any heading between 225 and 315 degrees will represent west. Headings between 0 and 45 degrees, and between 315 degrees and 360 degrees will represent north.

Write a program that reads a heading from the user and reports its compass direction. Your program should continue reading headings and reporting compass directions until the user enters a blank line. Report an appropriate error message if user enters a heading outside of 0 to 360 degrees and then go on and read additional input value(s). If the first value entered by the user is a blank line then your program should not display anything.

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

```
Enter a heading (0-360 degrees): 22
North
Enter a heading (0-360 degrees): 180
South
Enter a heading (0-360 degrees): 280
West
Enter a heading (0-360 degrees): 91
East
Enter a heading (0-360 degrees): <blank line>
```

Additional sample input and output is shown below:

```
Enter a heading (0-360 degrees): -4
That's not a valid heading.
Enter a heading (0-360 degrees): 362
That's not a valid heading.
Enter a heading (0-360 degrees): 0
North
Enter a heading (0-360 degrees): <blank line>
```

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

Answer the questions on this page on the provided answer sheet.
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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.

```
1: elif heading < 135:
3: elif heading < 225:
5: elif heading < 315:
7: elif heading < 360:
9: elif heading < 45:
12: else:
14: heading = float(input("Enter a heading (0-360 degrees): "))
16: heading = float(line)
18: if heading < 0:
23: if heading == 0:
25: if heading == 180:
27: if heading == 270:
29: if heading == 90:
34: line = input("Enter a heading (0-360 degrees):")
36: print("East")
38: print("North")
45: print("South")
47: print("That's not a valid heading.")
49: print("West")
56: while heading >= 0 and heading < 360:
58: while line != "":
```

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2. Which of the following years most closely matches when the first programmable electronic computer began operating?
   A. 1849
   B. 1867
   C. 1918
   D. 1945
   E. 1978

3. Approximately how long did the exponential growth that Gordon Moore predicted last?
   A. 2 years
   B. 10 years
   C. 25 years
   D. 50 years
   E. 100 years

4. Which area of computer science was responsible for the development of the seam carving algorithm?
   A. Computer Graphics
   B. Databases
   C. Distributed Systems
   D. Information Security and Privacy
   E. Software Engineering

5. Which level of competence in Bloom's taxonomy is characterized by the ability to bring together several distinct ideas to solve a problem?
   A. Analysis
   B. Comprehension
   C. Evaluation
   D. Knowledge
   E. Synthesis

6. Which of the following statements is most correct?
   A. An algorithm cannot include instructions that loop back to a previous step.
   B. An algorithm may include lines, arrows, and pictures.
   C. An algorithm must be written in a rigid, fixed, format that carefully follows precise syntax rules.
   D. Exactly two of the above statements are correct.
   E. Answers A, B and C are all correct.

7. Rules related to the meaning of a programming language statement are referred to as:
   A. Semantic rules
   B. Semaphore rules
   C. Signal rules
   D. Signature rules
   E. Syntactic rules

Answer the questions on this page on the provided answer sheet.
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8. The files in which python programs are stored are referred to as:
   A. Document files
   B. Input files
   C. Interpreter files
   D. Source files
   E. Variable files

9. Which of the following statements is **not** correct?
   A. Variable names may include any mixture of letters, numbers and dashes.
   B. Variable names must begin with a letter or an underscore.
   C. Variable names should be meaningful.
   D. Variable names shouldn't be a name that is already commonly used for another purpose.
   E. Variable names shouldn't be in all caps.

10. Which of the following operators has highest precedence?
    A. %
    B. **
    C. +
    D. //
    E. =

11. Consider the following code segment:

```
x = input("Enter x: ")
y = 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 8
    B. z is 5
    C. z is 13
    D. z is 85
    E. None of the above answers are correct

12. Which type of error will be detected and displayed before any statements in a program are executed?
    A. Logic Error
    B. Syntax Error
    C. Runtime Error
    D. Type Error
    E. Value Error

Answer the questions on this page on the provided answer sheet.
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13. Which of the following statements will display the value stored in total so that it is rounded to two decimal places?
    A. print("The total is: %.2f" % total)
    B. print("The total is: %.2f", total)
    C. print("The total is: %total" % .2f)
    D. print("The total is:" % (.2f, total))
    E. print("The total is:" % (total, "%.2f"))

14. A single 0 or 1 in a computer's memory is referred to as a:
    A. Bit
    B. Byte
    C. Fragment
    D. Nibble
    E. Nugget

15. When counting in binary, the number immediately after 1001_2 is:
    A. 0010_2
    B. 1010_2
    C. 1011_2
    D. 1100_2
    E. 1101_2

16. What is 111 base 8 equal to in base 10?
    A. 58_{10}
    B. 65_{10}
    C. 73_{10}
    D. 99_{10}
    E. 111_{10}

17. What is 66 base 10 equal to in base 2?
    A. 010001_2
    B. 0100001_2
    C. 100001_2
    D. 100010_2
    E. 1000010_2

18. Which of the following items is **not** a valid hexadecimal number?
    A. 0_{16}
    B. 4132_{16}
    C. $AFDC_{16}$
    D. $4A9F_{16}$
    E. None of the above answers are correct (all are valid hexadecimal numbers)

Answer the questions on this page on the provided answer sheet.
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19. Which of the following pieces of information is **not** encoded as part of an IEEE 754 floating-point number?
    A. The base
    B. The exponent
    C. The mantissa / fraction
    D. The sign
    E. None of the above answers are correct (all are items that are encoded as part of an IEEE 754 floating-point number)

20. Which of the following items is not a valid relational operator in Python?
    A. !=
    B. <
    C. =
    D. >=
    E. None of the above answers are correct (all are valid relational operators in Python)

21. Consider the following truth table.

x	Y	Column A	Column B	Column C	Column D	Column E
False	False	False	False	False	True	True
False	True	True	False	True	False	True
True	False	True	False	False	False	True
True	True	False	True	True	True	False

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

22. Consider the following code segment:

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

if n >= 0:
  print("A")
if n <= 0:
  print("B")
```

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 prints only A
    C. The program prints only B
    D. The program prints A followed by B
    E. The program prints B followed by A

Answer the questions on this page on the provided answer sheet.
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23. Consider the following code segment:

```
a = int(input("Enter an integer: "))

if a == 3:
  a = a - 1
elif a == 2:
  a = a - 1
elif a == 1:
  a = 4
else:
  a = 0

print(a)
```

What value is displayed if the user enters 2?

A. 0
B. 1
C. 2
D. 3
E. 4

24. Consider the following code segment:

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

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

What letters are displayed when the user enters 1 for x and 0 for y?

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

Answer the questions on this page on the provided answer sheet.
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25. Which type of testing is primarily functional or behavioural?
    A. Black box testing
    B. Condition coverage testing
    C. Path coverage testing
    D. Statement coverage testing
    E. White box testing

26. Which of the following problems would be appropriate to solve with a for loop?
    A. Displaying all of the questions on a test
    B. Performing a task on every column in an image
    C. Reading values until a particular value is entered by the user
    D. Exactly two of the above answers are correct
    E. Answers A, B and C are all correct

27. Which of the following types of loops are post-tested?
    A. Do while loop
    B. For loop
    C. Repeat until loop
    D. Exactly two of the above answers are correct
    E. Answers A, B and C are all correct

28. Consider the following program:

```
n = int(input("Enter an integer:"))

for i in range(n, 0, -1):
  print("A")
```

    If the user enters 4 for n how many copies of the letter A are displayed?
    A. 0
    B. 1
    C. 3
    D. 4
    E. 5

Answer the questions on this page on the provided answer sheet.
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29. Consider the following program:

```
i = int(input("Enter an integer: "))
j = 1

while j != i:
  if j < 4:
    j = j * 2
  else:
    j = j + 1
  print("X")
```

If the user enters 3 for i how many copies of the letter X are displayed?

A. 0
B. 1
C. 2
D. 3
E. None of the above answers are correct

Consider the following program for the next two questions:

```
a = int(input("Enter an integer: "))
b = int(input("Enter another integer: "))
x = 0
y = 0

for i in range(1, a):
  j = i
  while j < b:
    if j % 2 == 0:   # If j is even
      y = y + 1
    j = j + 1
    x = x + 1

print(j, x, y)
```

30. What output is displayed if the user enters 2 for a and 2 for b?

A. 1 0 0
B. 2 1 0
C. 3 2 1
D. 3 2 3
E. 4 5 2

31. What output is displayed if the user enters 4 for a and 3 for b?

A. 3 3 2
B. 3 3 3
C. 3 4 2
D. 4 4 2
E. 4 5 3