Computer Science 217

Midterm Exam

Fall 2011

November 3, 2011

Name: _____

ID: _____

Class Time (Circle One):   1:00pm   3:00pm

Instructions:

- Neatly print your name and ID number in the spaces provided above.
- Pick the best answer for each multiple choice question.
- Answer each question by writing the correct answer in the space provided. **Answer all multiple choice questions using UPPER CASE letters.**
- This exam consists of 11 pages, including the cover. Before answering any questions count the pages and ensure that they are all present.
- You have 1 hour 30 minutes to complete this exam.
- 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**

1. Which year most closely approximates when Charles Babbage worked to build a mechanical computer for evaluating polynomials?
   A. 1800
   B. 1850
   C. 1900
   D. 1950
   E. 2000

   Answer: _____

2. The area of computer science that includes aspects of biology and behavioral sciences is:
   A. Computer Vision
   B. Distributed Systems
   C. Human Computer Interaction
   D. Information Security
   E. Theory of Computation

   Answer: _____

3. Which of the following items is **not** connected to the north bridge in a modern computer?
   A. CPU (Central Processing Unit)
   B. Graphics Subsystem
   C. Main Memory
   D. Printer
   E. South Bridge

   Answer: _____

4. The technique that can be used to construct an algorithm by repeatedly breaking problems into 3 to 5 smaller pieces is known as:
   A. Iterative Analysis
   B. Iterative Synthesis
   C. Programming
   D. Recursive Analysis
   E. Top Down Design

   Answer: _____

5. Within Bloom's Taxonomy, the level of competence that is characterized by the ability to solve a problem by following a known pattern is called:

6. Write down a sequence of characters that is **not** a legal name for a variable: _____.

7. In one sentence or less, explain why the name you provided is **not** legal.
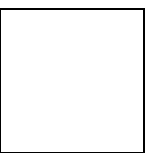
8. The operator with highest precedence is:
   A. +
   B. =
   C. >=
   D. and
   E. not

   Answer: _____

9. Consider a program that runs to completion, but delivers an incorrect result. The error in this program would be classified as a:
   A. Condition Error
   B. Logic Error
   C. Path Error
   D. Runtime Error
   E. Syntax Error

   Answer: _____

10. An executable file contains:
    A. High level programming language instructions
    B. Low level programming language instructions
    C. Machine code
    D. Program results
    E. Source code

    Answer: _____

11. Fill in the blank in the following print statement so that it displays the value of a variable named x (which is assumed to exist) with 1 digit to the right of the decimal point.

    ```
    print("The value of x is _____)
    ```
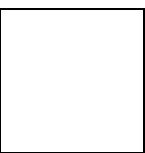
12. Consider the following code segment:

    ```
    a = input("Enter the value of a: ")
    b = input("Enter the value of b: ")
    print(a + b)
    ```

    If the user runs the program and enters 11 for a and 9 for b then it will display:
    A. 9
    B. 20
    C. 119
    D. 911
    E. None of the above answers are correct

    Answer: _____

13. Consider the following code segment:

```
a = "5.0"
b = "10.0"
x = float(a / b)
print(x)
```
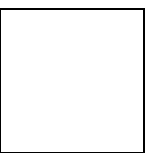
When it runs, the output will be:
    A. 0
    B. 0.5
    C. 2
    D. 2.0
    E. None of the above answers are correct

Answer: _____
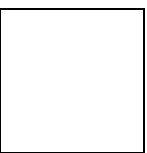
14. Convert 214 base 5 to base 10.

Answer: _____

15. Convert 203 base 10 to hexadecimal.

Answer: _____

16. (2 marks) Convert 564 base 7 to base hexadecimal.

Answer: _____

Consider the following code segment:

```
a = int(input("Enter a value: "))

if a < 0:
  print("A")
  a = a + 1
if a > 0:
  print("B")
  a = a - 1
elif a == 0:
  print("C")
```
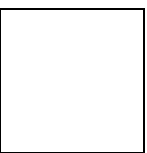
17. If the user enters -1 then the program will output: _____

18. If the user enters 1 then the program will output: _____

19. The testing technique that concentrates on performing functional and behavioral tests is known as:

20. Complete the truth table for the expression `(A xor B) and (not A or B)`. Draw a box around the column that represents your result so that it is clear which column we are supposed to mark.

| A	B	
0	0	
0	1	
1	0	
1	1	

Consider the following code segment:

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

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

21. If the user enters -1 for x and 1 for y then the program will output: _____

22. If the user enters 0 for x and -1 for y then the program will output: _____

23. If the user enters -2 for x and -1 for y then the program will output: _____

24. What is the minimum level of test coverage that must be achieved in order to prove that a program does not contain any bugs?
    A. Condition Coverage
    B. Graph Coverage
    C. Path Coverage
    D. Statement Coverage
    E. None of the above answers are correct

    Answer: _____
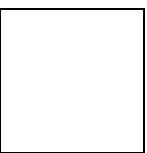
25. (3 marks) The following program is supposed to read a number from the user, and compute the total of all of the integers from 1 up to and including that. For example, if the user enters 4, then the program should compute the sum as 1 + 2 + 3 + 4 = 10. If the user enters 7 then the program should compute the sum as 1 + 2 + 3 + 4 + 5 + 6 + 7 = 28. If the user enters 1 then the program should compute the sum as 1 = 1.

Unfortunately the program contains (at least) 3 bugs. The comments are all correct, and describe what the program is supposed to do. Circle each of the 3 bugs (and only the bug) and write 1 sentence or less next to each bug indicating what you would need to do to fix it. Note that in this context a bug is defined to be something that will stop the program from generating a correct result, or causes the program to crash. It does **not** include stylistic issues, differences in output messages, spelling mistakes in prompts, etc.

```
#  Read an integer from the user
mx = int(input("Enter the maximum value: "))

#  If the input value entered is invalid then display
#  an appropriate error message.
if mx <= 1:
  print("That wasn't valid input")

else:
  #  Compute the sum of all integers from 1 to mx
  total = 0
  for i in range(1, mx):
    print("Adding",i,"to the total...")
    total = total + i

#  Display the sum of all the numbers from 1 to mx
print("The sum of the numbers from 1 to",mx,"is",total)
```

26. When one loop appears inside of another, the loops are said to be:
    A. Dating
    B. Divorced
    C. Entangled
    D. Married
    E. Nested

Answer: _____

27. If you are writing a python program that will continue to read values from the user until the user enters a negative number, the best kind of loop to use is a:
    A. Do-While loop
    B. For loop
    C. Repeat-Until loop
    D. While loop
    E. Two or more of the above types of loops are equally good choices

Answer: _____
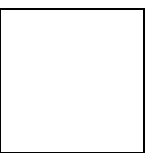
Consider the following code segment:

```
a = int(input("Enter a: "))
b = int(input("Enter b: "))

while a != b:
  if a < 5:
    a = a + 1
  else:
    a = a + 2

  print("X")
```

28. If the user enters -1 for a and 9 for b, then the number of X's output by the program will be:

29. If the user enters 2 for a and 10 for b, then the number of X's output by the program will be:

30. If the user enters 4 for a and 4 for b, then the number of X's output by the program will be:

Consider the following code segment:

```
a = 5

for i in range(2,6):
  a = a + i

print(a)
```

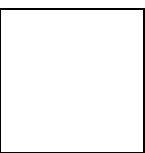31. The value displayed when this code segment runs is: _____

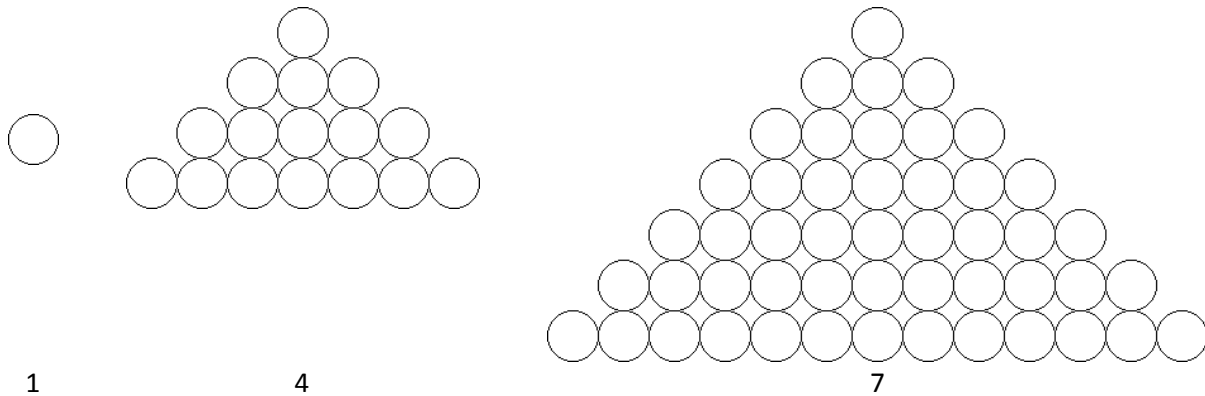Consider the following code segment:

```
x = 0
i = 0

while i < 3:
  x = x + 1
  i = i + 1
  for j in range(i,4):
    x = x + 1

print(x)
```

32. The value displayed when this code segment runs is: _____

33. (12 marks) The following images show piles of circles. The left image is pile of height 1, the middle pile is of height 4, and the right pile is of height 7.

1   4   7

You will write a program that draws such piles of circles. All of the circles should be drawn in bright green.

Your program will begin by asking the user to enter the height of the pile. If the user enters a value less than 1 or greater than 10 then your program should display a meaningful error message. Your program should include a prompt for the user. Because your program will be used with Quickdraw you **cannot** use print statements for prompts or error messages.

If the user entered a valid height for the pile then your program should draw the pile by printing out the appropriate Quickdraw commands to draw the circles. Your program must make appropriate use of loops – you may use at most 4 print commands for displaying the circles that make up the pile. In all cases, the top row of the pile will consist of a single circle. Each subsequent row will have two more circles than the previous row.

Each circle in the diagram has a radius of 20 pixels. As such, the centers of any 2 adjacent circles are 40 pixels apart. Your pile should be centered horizontally in the window (recall that Quickdraw's window is 800 pixels wide) and the pile should be placed vertically so that all of the circles are visible.

When creating your solution you don't need to worry about magic numbers or comments. However, including a few comments explaining what you are trying to do may help you design your solution, and may help us give you partial credit for an incorrect solution.

Place your solution to this question on the next page.

Don't use this space. No, really, don't do it!

0

Place your answer to the programming question on this page.