

Computer Science 217

Midterm Exam

Fall 2008

October 28, 2008

Name: _____

ID: _____

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.**
- Any answer that is ambiguous due to unclear handwriting will be considered incorrect.
- 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 75 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.
- Unless noted otherwise, all pieces of code provided on the exam are syntactically correct. If there is a minor syntax error, simply correct it on your exam paper and answer the question as if the code was correct.
- **DO NOT TURN PAST THIS PAGE UNTIL YOU ARE INSTRUCTED TO BEGIN**

1. Computer Science can be defined as:
- A. The study of electrical components
 - B. The study of computation and computer hardware and software
 - C. The study of the theoretical foundations of information and computation
 - D. Exactly two of the above answers are correct
 - E. Answers a, b, and c are all correct

Answer: _____

2. The branch of computer science that identifies techniques for developing large pieces of software is:
- A. Theory of Computation
 - B. Artificial Intelligence
 - C. Software Engineering
 - D. Databases
 - E. None of the above answers are correct

Answer: _____

3. One of the earliest electronic computers was known as:
- A. Aibo
 - B. Qrio
 - C. Babbage
 - D. Abacus
 - E. Eniac

Answer: _____

4. The most important consequence of Moore's law is:
- A. The speed of computers doubles every two years without an increase in cost
 - B. The speed of computers doubles every ten years without an increase in cost
 - C. Both the cost and speed of computers doubles every 6 months
 - D. Software gets slower faster than hardware gets faster
 - E. Software gets faster slower than hardware gets faster

Answer: _____

5. What is an algorithm?

6. The mechanism we used to make the output from a Python program the input to QuickDraw is known as a:

Answer: _____

7. The connection between the major internal components of a computer such as the graphics subsystem, central processing unit and RAM is known as:

Answer: _____

8. [2 marks] List the names of the six levels of competence in Bloom's Taxonomy:

9. Select one of the levels of competence from Bloom's Taxonomy and briefly describe the skill(s) one would be expected to have if they achieved that level of competence. Make sure you clearly state which level of competence you selected.

10. [2 marks] Create a truth table for the logical expression: $(A \text{ and } (\text{not } B)) \text{ or } (\text{not } C)$.

11. Write a logical expression that is equivalent to the following truth table:

A	B	Result
0	0	1
0	1	1
1	0	1
1	1	0

Answer: _____

12. Convert 356 base 7 to base 10.

Answer: _____

13. Convert 67 base 10 to binary.

Answer: _____

14. Convert 12012 base 3 to base 9.

Answer: _____

15. [2 marks] Convert 3426 base 7 to base 16.

Answer: _____

16. Consider the following code segment.

```
f = input();
print "%0.0f" % f

c = (f - 32) * 5.0 / 9
print "%2.1f" % c
```

If the user enters 77.0 when the program executes, its output will be:

Consider the following code segment.

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

if (x == 2):
    print x
    x = x + 1;
elif (x == 3):
    print x;
    x = x + 1;
if (x == 1):
    print x;
    x = x + 1;
else:
    print x;
    x = x + 1;
```

17. If the user enters 1 when prompted, what value(s) will be printed? _____

18. If the user enters 2 when prompted, what value(s) will be printed? _____

19. If the user enters 3 when prompted, what value(s) will be printed? _____

20. Which type of Python error will always be caught when you execute your program regardless of the input values that are provided?

- A. Semantic errors
- B. Logic errors
- C. Runtime errors
- D. Syntax errors
- E. More than one of the above answers is correct

Answer: _____

Consider the following code segment:

```
x = input("Enter a value for x: ")
y = input("Enter a value for y: ")
a = input("Enter a value for a: ")
b = input("Enter a value for b: ")

if x == y:
    print "A"

if a < b:
    print "B"
elif b < a:
    print "C"
```

21. What is the minimum number of test cases required in order to achieve path testing coverage for this program?

Answer: _____

22. [2 marks] List a minimal set of test cases that will provide path testing coverage for the code segment shown above. Clearly state what values will be entered for x, y, a and b for each test case, and the output for that test case. Hint: It is possible to construct all of the required test cases using only 0 and 1 for the values of the variables.

23. 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. Statement Coverage
- C. Heuristic Coverage
- D. Path Coverage
- E. None of the above answers are correct

Answer: _____

24. [2 marks] Briefly describe two differences between black box testing and white box testing.

Consider the following code segment:

```
t = 0
s = input("Enter s: ")

for i in range(1,s):
    print t,
    t = t + 1
print t
```

25. If the user enters the value 0 then the output will be: _____

26. If the user enters the value 1 then the output will be: _____

27. If the user enters the value 3 then the output will be: _____

28. If the user enters the value 5 then the output will be: _____

29. Which of the following statements is most correct?

- A. A syntactically correct function always includes a return statement
- B. A function may have many parameters
- C. The first function defined in a Python source file is the first function that will be executed
- D. Exactly two of the above answers are correct
- E. Answers A, B and C are all correct

Answer: _____

30. [2 marks] List two advantages of breaking a program into several functions instead of writing your entire program in a single function:

Consider the following code segment.

```
total = 0
i = 7
j = input("Enter j: ")

while (j < i):
    print "B",
    for k in range(j,i):
        print k,
        total = total + k
    total = total + j
    j = j + 1

print total
```

31. [3 marks] What output will be generated if the user enters the value 4 for j?

32. Which of the following values for j will result in no output being generated?

- A. -1
- B. 1
- C. 5
- D. 9
- E. None of the above answers are correct

Answer: _____

33. (10 marks) Consider a degree two polynomial of the form $ax^2 + bx + c$. The roots of such a polynomial can be determined using the quadratic equation:

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Within this equation, the quantity $b^2 - 4ac$ is referred to as the discriminant. It can be used to determine how many roots the equation has. If the discriminant is negative then the equation has no real roots. If the discriminant is zero then the equation has one real root. Otherwise the equation has two real roots.

Write a Python program that reads the coefficients of the equation, a , b and c , from the user and outputs a message indicating how many real roots the equation has, and what those roots are. Your program should include everything necessary for the program to run successfully and generate the correct result. Your program should include appropriate prompt(s) for the user and messages that identify the output.

34. (10 marks) Write a Python program that reads one integer, n , from the user. The program will display the sum of the odd numbers from one to n (inclusive) and the sum of the even numbers from one to n (inclusive) with appropriate messages identifying the output. Your program will use a loop to compute each of these values. If the value of n that you are provided with is less than 1 then you should display 0 for each of the totals. Note that because you are computing both the sum of the odd and even numbers, one of your totals will not actually include n .

Example input values and their expected output:

Input (n)	Even Total	Odd Total
-2	0	0
1	0	1
3	2	4
6	12	9