

Computer Science 217

Midterm Exam

Fall 2010

November 3, 2010

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 15 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. The area of computer science that studies techniques for designing and building software so that it is easy to maintain and expand in the future is:
- A. Distributed Systems
 - B. Human Computer Interaction
 - C. Information Visualization
 - D. Software Engineering
 - E. Theory of Computation

Answer: _____

2. Which of the following is **not** a type of electric switch that can be used to construct a computer?
- A. Pipe
 - B. Relay
 - C. Transistor
 - D. Vacuum Tube
 - E. None of the above answers are correct

Answer: _____

3. In a modern computer, the main memory (RAM) is normally connected directly to the?
- A. ALU (Arithmetic Logic Unit)
 - B. North Bridge
 - C. PCI (Peripheral Component Interconnect) Bus
 - D. South Bridge
 - E. USB (Universal Serial Bus)

Answer: _____

4. The process of creating software by translating an algorithm into a computer language is known as:
- A. Analyzing
 - B. Programming
 - C. Running
 - D. Solving
 - E. Top Down Designing

Answer: _____

5. Consider the following statement:

“The complexity for minimum component cost has increased at a rate of roughly a factor of two per year ... Certainly over the short term this rate can be expected to continue, if not increase. Over the longer term, the rate of increase is a bit more uncertain, although there is no reason to believe it will not remain nearly constant for at least 10 years.”

This statement is known as:

6. Within Bloom's Taxonomy, the level of competence that is characterized by the ability to combine several ideas to form a new idea or solve a problem is known as:

7. (2 marks) Consider the following list of variable names that are being considered for use in a Python program. Some of these names can be used in a Python program, while others are illegal. Circle all of the names that are **allowed** to be used.

2morrow	c3po	Calgary Stampede
_exam_count	Four	high-five
print	while	xyz

8. The process of converting a program from human-readable source code into machine language instructions is accomplished using a:

- A. Bridge
- B. Compiler
- C. Operator
- D. Pipe
- E. Virtual Machine

Answer: _____

9. Consider the following expression that could appear in a Python program.

```
z = 1 - 2 ** 3 * 4 + 5
```

After it is evaluated, the value of z will be: _____

10. Consider a program that generates some output and then crashes. 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: _____

11. Consider the following code segment:

```
a = 5
b = "9"
print a + b
```

When the program is run, it will display:

- A. 5
- B. 9
- C. 14
- D. 59
- E. None of the above answers are correct

Answer: _____

12. Consider the follow code segment:

```
a = 7.0
b = 4
c = a / b
print "%.3f" % c
```

When the program is run, it will display: _____

13. An unnamed or poorly documented numeric value is known as:

14. Convert 234 base 6 to base 10.

Answer: _____

15. Convert 174 base 10 to base 14.

Answer: _____

16. (2 marks) Convert 465 base 7 to base hexadecimal.

Answer: _____

17. (2 marks) Convert 2301 base 4 to base 9.

Answer: _____

18. The process of changing information into data is known as:

19. Complete the truth table for the expression $(A \text{ and } (\text{not } B)) \text{ or } ((\text{not } A) \text{ and } B)$. Be sure to clearly label the column that represents your result.

A	B	
0	0	
0	1	
1	0	
1	1	

Consider the following code segment:

```
x = input()
if (x < 2000):
    print "A"

if (x < 1000):
    print "B"
else:
    print "C"
```

20. If the user enters 500 for x then the output from this program will be: _____

21. If the user enters 2000 for x then the output from this program will be: _____

Consider the following code segment:

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

if x <= 4:
    print x
    if y > 3:
        x = x + 1
        print y
    x = x - 1
    y = y - 1
elif x == 2:
    x = x + 1
    print x

if y <= 3:
    y = y - 1
    print x
else:
    print y
```

22. If the user enters 2 and 4 when prompted, the output from this program will be: _____

23. If the user enters 4 and 3 when prompted, the output from this program will be: _____

24. If the user enters 5 and 3 when prompted, the output from this program will be: _____

25. Which of the following operators has the lowest precedence?

- A. =
- B. <
- C. +
- D. *
- E. and

Answer: _____

26. Which of the following statements is most correct?

- A. White box testing involves running behavioral tests that examine whether the program responds correctly as the user runs the program
- B. If path coverage is achieved while testing a program then the program is guaranteed to be bug-free
- C. Of the three levels of test coverage discussed in class, statement coverage provides the greatest level of assurance that a program is bug free
- D. Every line of code in a program will be executed by a set of test cases that achieve condition coverage for a program
- E. None of the above statements is correct

Answer: _____

27. Consider the following Python code segment:

```
if a <= b:
    print "Computer Science"
elif a >= b:
    print "University of Calgary"

if c == d:
    print "Faculty of Science"

print "I guess we made it to the end..."
```

How many test cases are required to achieve statement level test coverage for this code segment? _____

28. What is the minimum number of times that a post-tested loop will execute?

Consider the following code segment.

```
a = input()
b = input()

while (a < b):
    a = a + 1
    if (a == 2) or (a == 4) or (a == 5):
        b = b - 2

print (a + b)
```

29. If the user enters 0 for a, and 0 for b, then the value displayed by the program will be: _____

30. If the user enters 1 for a and 10 for b, then the value displayed by the program will be: _____

31. If the user enters 5 for a and 10 for b, then the value displayed by the program will be: _____

32. How many copies of the letter A does the following program display?

```
j = 1
while (j < 5):
    for i in range(0,100):
        print "A"
    j = j + 1
```

Answer: _____

33. (12 marks) Some, but not all, positive integers can be expressed as a sum of exactly two integer squares. For example, the integer 5 can be expressed as $2^2 + 1^2$. However, the integer 6 cannot be expressed as the sum of two integer squares. In addition, some numbers can be formed as the sum of two different squares. For example, $50 = 5^2 + 5^2 = 7^2 + 1^2$.

Your task is to write a program that reads an integer from the user, and determines if it can be expressed as the sum of two squares. Your program should report the outcome to the user including using meaningful messages that match the sample output below. If the user enters a number less than 0 then your program should display an appropriate error message and no additional output.

Input:

1

Output:

$1 = 0 * 0 + 1 * 1$

Input:

3

Output:

3 cannot be formed as the sum of two squares

Input:

25

Output:

$25 = 0 * 0 + 5 * 5$

$25 = 3 * 3 + 4 * 4$

Input:

-1

Output:

Invalid input. Next time enter a positive integer.

Hint: You can determine if a number, n , is a sum of two integer squares by checking all combinations of two values from 0 up to and including n to see if their squares sum to the desired total.

Place your answer to this question on the next page.

Place your answer to the programming question on this page.