

Computer Science 217

Midterm Exam

Summer 2010

July 26, 2010

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.**
- 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 45 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 mechanical computer designed and partially constructed (but not completed) in the late 1840s was:
- A. Abacus
 - B. Babbage Difference Engine
 - C. Electronic Numerical Integrator and Computer
 - D. Relay
 - E. Wii

Answer: _____

2. The area of computer science that is most concerned with problems such as race conditions and deadlock is known as:
- A. Computer Graphics
 - B. Distributed Systems
 - C. Information Security
 - D. Information Visualization
 - E. Software Engineering

Answer: _____

3. List two types of electric switches:

4. In a modern computer, the connection between the slow speed components such as the keyboard, mouse, printer, sound system and hard disk is known as:

5. Which of the following statements is most correct?
- A. An algorithm consists of a set of steps that solve a problem
 - B. Algorithms are written in a format that a computer can read
 - C. Algorithms must be expressed using a precise syntax
 - D. Exactly two of the above answers are correct
 - E. Answers A, B and C are all correct

Answer: _____

6. Within Bloom's Taxonomy, the level of comprehension that is characterized by the ability to combine multiple distinct ideas to solve a new problem is known as:

7. List two different techniques that can be used to run programs on a computer:

8. State Moore's Law, or its most important consequence:

9. Consider the following code segment:

```
x = input()
y = input()
z = x + y
print z
```

When the program is run, the user first enters 10 and then 5. The output generated by the program will be:

- A. 5
- B. 10
- C. 15
- D. 105
- E. None of the above answers are correct

Answer: _____

10. Consider the program from the previous question. If the user first enters "John" (without the quotes) followed by "Smith" (without the quotes) then the output will be:

- A. 0
- B. John Smith
- C. JohnSmith
- D. Nothing is displayed by the program
- E. None of the above answers are correct

Answer: _____

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

```
z = 3 + 2 ** 4 * (6 - 5)
```

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

12. Consider a program that generates some output and then crashes. The error in this program would most likely be a:

- A. Logic Error
- B. Path Error
- C. Runtime Error
- D. Security Error
- E. Syntax Error

Answer: _____

13. What is a magic number?

14. Convert 242 base 6 to base 10.

Answer: _____

15. Convert 222 base 10 to hexadecimal.

Answer: _____

16. (2 marks) Convert 362 base 8 to base 3.

Answer: _____

17. (2 marks) Convert 330 base 4 to base 9.

Answer: _____

18. Consider the logical expression `(not (A and B)) or C`. In the truth table for this expression, the number of rows for which the expression evaluates to `true` is:

Answer: _____

Consider the following code segment:

```
z = input()

if (z < 2000):
    print "A"

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

19. If the user enters 500 for z then the output from the program will be: _____

20. If the user enters 1500 for z then the output from this program will be: _____

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

Consider the following code segment:

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

if x >= 2:
    y = y + 1
    print x
    if y > 3:
        x = x - 1
        print y
        x = x - 1
    else:
        print x
        x = x + 1

if y >= 3:
    print x
else:
    print y
```

22. If the user enters 1 and 3 when prompted, the output from this program will be: _____
23. If the user enters 3 and 1 when prompted, the output from this program will be: _____
24. If the user enters 2 and 2 when prompted, the output from this program will be: _____
25. Which of the following operators has the lowest precedence?
- A. not
 - B. **
 - C. +
 - D. >
 - E. =

Answer: _____

26. What level of white-box test coverage must be achieved in order to prove that your program does not contain any bugs?
- A. Condition coverage
 - B. Graph coverage
 - C. Heuristic coverage
 - D. Path coverage
 - E. None of the above answers are correct

Answer: _____

27. Consider the following Python code segment:

```
if a < b:
    print "That's good..."
elif a >= b:
    print "Even better!"

if c == d:
    print "c is equal to d!"
else:
    print "c and d are not equal"
```

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?

- A. 0
- B. 1
- C. 2
- D. 10
- E. None of the above statements are correct.

Answer: _____

Consider the following code segment. Recall that when the % operator is applied to two integers it computes the remainder of dividing the left number by the right number.

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

for i in range(6,b):
    b = b - 2
    if (a % 2) == 0:
        a = a + 1

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 2 for a and 10 for b, then the value displayed by the program will be: _____

31. If the user enters 5 for a and 8 for b, then the value displayed by the program will be: _____

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


```
i = 0;
while (i < 500):
    j = 1;
    while (j < 5):
        print "X"
```

Answer: _____

33. (6 marks) Write a program that reads two integers, a, and b, from the user. Your program must compute the result of $a \% b$ (recall that $\%$ is the remainder operator). However, your program cannot use the $\%$ operator anywhere in it. Instead, you must compute the remainder through another technique. Your program must include meaningful prompts and meaningful output messages that match the sample output below.

Hint: repeatedly subtracting b from a until you get a value less than b will give you the remainder.

Sample input / output (values entered by the user are shown in **bold**):

Run 1:

```
Enter the numerator: 15
Enter the denominator: 6
The remainder when 15 is divided by 6 is 3
```

Run 2:

```
Enter the numerator: 16
Enter the denominator: 2
The remainder when 16 is divided by 2 is 0
```

You may assume that the user always provides positive integers as input.

34. (10 marks) Write a program that reads an integer from the user. Your program will draw a multiplication times table for the integers from one through to the number entered the user. Recall that a multiplication times table consists of columns and rows labeled from 1 to the value entered by the user. Each of the numbers in the table (other than the labels) is the product of its row number and its column number.

If the user enters a value of 0 or less your program should display a meaningful error message, and no additional output.

Sample input: 1

Sample output:

```
X  1
1  1
```

Sample input: 3

Sample output:

```
X  1  2  3
1  1  2  3
2  2  4  6
3  3  6  9
```

Sample input: 5

Sample output:

```
X  1  2  3  4  5
1  1  2  3  4  5
2  2  4  6  8 10
3  3  6  9 12 15
4  4  8 12 16 20
5  5 10 15 20 25
```

Sample input: 0

Sample output: Please enter a value greater than 0.

Hints:

- 1) If you want to print something without moving down to the next line, include a comma as the last item on the line. For example, `print "Hello"` will display the word `Hello` and move down to the next line. The statement `print "Hello",` will display the word `Hello` without moving down to the next line.
- 2) If you need to move to the next line without printing anything else, use the statement `print ""`
- 3) While the columns in my sample output all line up nicely, you don't need to worry about this as long as you get the correct numbers on the correct lines.

Place your answer to this question on the next page.

Place your answer to question 34 on this page.