

CMSC131

Midterm #1

First Name: _____

Last Name: _____

University ID: _____

Grader Use Only:

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I pledge on my honor that I have not given or received any unauthorized assistance on this examination.

Your signature:

General Rules (Read):

- This exam is closed-book and closed-notes.
- If you have a question, please raise your hand.
- Total point value is 100 points.
- **WRITE NEATLY.** If we cannot understand your answer, we will not grade it (i.e., 0 credit).

1. (2 pts) Which of the following are considered secondary memory devices? (Circle all that apply.)

DVD

RAM

USB flash drive

Touchscreen monitor

2. (2 pts) Name the advantage that primary memory has over secondary memory.

3. (2 pts) What is a byte?

4. (2 pts) How many different combinations of 0's and 1's can be represented with 500 bits?

5. (2 pts) How is your Java source code translated into native machine code? (Circle ONE.)

Compiler

Interpreter

Combination of compiler and interpreter

6. (2 pts) Name the two primitive types used to store floating point numbers (numbers with decimal points in them), and indicate how many bytes of memory each type uses.

7. (2 pts) Which kind(s) of variables can be declared inside a method? (Circle all that apply.)

local

instance

static

8. (2 pts) What term do we use to describe the situation where two separate reference variables refer to the same object?
9. (2 pts) Suppose there is a class called “Bird” containing an instance variable called *beak*, and a static variable called *number*.
- Is the following statement permissible in an *instance* method of the Bird class?
`System.out.print(number);`
 - Is the following statement permissible in a *static* method of the Bird class?
`System.out.print(beak);`
10. (2 pts) If you were an engineer in the 1950’s, which programming language would you have been most likely to use?
11. (2 pts) What term is used to describe 2^{20} bytes?
12. (4 pts) List the following operators in order of precedence (highest first). (Do not number them; instead re-write them in the correct order.)
- `&&` `>=` `*=` `*` `--` `||`
13. (2 pts) Which of the following could be used to name variables in Java? We’re not asking if they are good style, just whether or not they are permissible. (Circle all that apply.)

`Foo_bar`

`For`

`3Man`

`fish&chips`

14. (3 pts) Write the output for this code fragment in the box.

```
int x = 7;
int y = 5 + --x;
int z = x-- - 3;
System.out.println(x);
System.out.println(y);
System.out.println(z);
```



15. (2 pts) Decide whether each of the following code fragments are valid. (Circle either VALID or INVALID for each part.)

a. `short x = 17;`
`int y = x;`

VALID / INVALID

b. `int q = 7;`
`short r = q;`

VALID / INVALID

16. (2 pts) Which kinds of variables are given default values if they are not initialized explicitly? (Circle all that apply.)

static

local

instance

17. (3 pts) Write the binary representation of the number twenty-seven.

18. [2 pts] Using a single Java statement, declare two `char` variables and assign to them characters representing the first two letters of the alphabet, respectively.

19. [2 pts] What word describes joining two sequences together to form a longer sequence?

20. [2 pts] What is the output?

```
int a = 7,  
b = 12;  
if (b > 6 || ++a == 7) {  
    a += 4;  
}  
System.out.println(a);
```

21. [3 pts] What will be the output?

```
System.out.println( 35 / 6 % 4 * 2 );
```

22. (2 points) What kinds of variables are used to represent the “state” of objects? (**Circle all that apply.**)

instance

static

local

23. (2 points) Write a JUnit assertion that will cause the current test to fail if the variable *x* is equal to anything larger than 7. (You don’t have to write a whole JUnit test, just a single assertion.)

24. (2 points) You have two JUnit tests, testA and testB. There are three assertions in testA. When running these tests, the second assertion in testA fails.

A. Will the third assertion in testA run? YES / NO

B. Will testB be performed? YES / NO

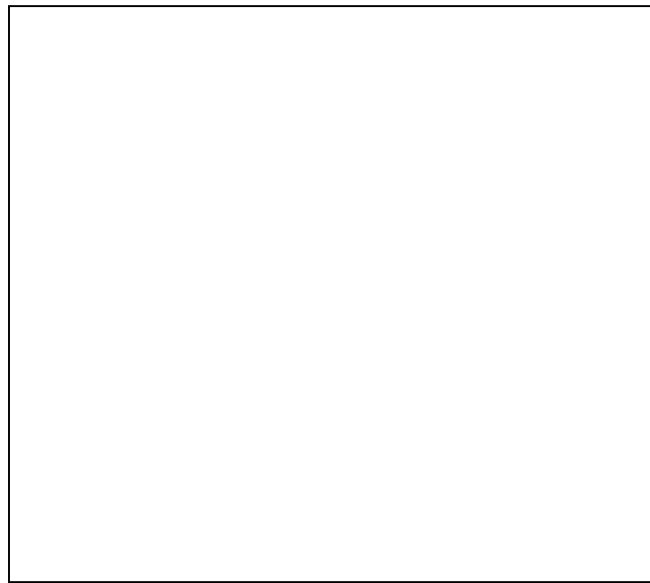
25. (8 pts)

```
int y = 24;  
Cat a = new Cat();  
Cat b = new Cat();  
Cat c = b;
```

Assume there is a class called Cat. Draw the memory diagram for the code fragment above, using the same style that was illustrated in class. Use a circle to indicate a Cat object.



STACK



HEAP

26. (12 points) Fill in the method below. The method should return the “Greatest Common Factor” of the two parameters. (The GCF is the largest integer that is a factor of both values). You may assume that both parameters are positive.

Examples: If the parameters are 20 and 50, then the GCF is 10. If the parameters are 45 and 15 then the GCF is 15. If the parameters are 13 and 7 then the GCF is 1.

```
public static int GCF(int a, int b) {
```

27. (10 points)

Write a public static method called `parabolic` that has one parameter, which is an `int` variable called `rows`. The return type for your method should be `void`. The method should print a parabolic shape like the one below. Note that the length of each row is the square of an integer: 1, 4, 9, 16, 25, etc. Below is the output for the case where the parameter is 7. (The top row has 49 stars, then 36, then 25, etc.) **You must use for-loops for this problem. You will receive no points for using while or do-while loops.**

```
*****
*****
*****
*****
*****
****
***
**
*
```


28. (17 points total)

Write a public class called `Alien`. The class should have two instance variables: an `int` called `numHeads`, and a `String` called `name`. Your class should include the following features:

- A constructor that takes two parameters and initializes the instance variables to match them.
- A copy constructor.
- An instance method called `growAnotherHead` which increases the number of heads by one, and concatenates the `String` “ with an extra head” to the `Alien`’s name. This method should return the number of heads the alien had *before* the method was called.
- An equals method (as shown in class) that will return `true` if both aliens have the same name and the same number of heads, and `false` otherwise.

[Write your answer below and on the back page.]

