

## CS 101, Prof. Loftin: Final Exam, May 11, 2009

Name: \_\_\_\_\_

All your work should be done on the pages provided. Scratch paper is available, but you should present everything which is to be graded on the pages of the test. The test is a total of 104 points. Good luck!

Problem	Grade
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total	

1. (8 pts) Write a method

```
public static void printAsterisks(int[] ar)
```

which accepts the parameter `ar`, an array of integers, and prints out for each value stored in the array at index `index`, a line of `ar[index]` asterisks. For example, if `ar` holds the array `{3,4,5,0,1}`, the output to the screen should be

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

```
*
```

2. (8 pts) Consider the following (partially defined) class `Vec`, which represents a vector in 3-space with coordinates `x`, `y`, `z`:

```
public class Vec{
    private double x,y,z;
    public Vec(double a, double b, double c){
        x = a; y = b; z = c; }
    public String toString(){
        return "(" + x + ", " + y + ", " + z + ")"; }
    public double dot(Vec w){/* Fill in */}
    public Vec cross(Vec w){/* Fill in */}}
```

Below, implement the methods `dot` and `cross`, which represent the dot product and cross product of the two vectors. Here are the formulas: the dot product of two vectors  $(x, y, z)$  and  $(x', y', z')$  is a real number given by  $(x, y, z) \cdot (x', y', z') = xx' + yy' + zz'$ . On the other hand, the cross product of the same two vectors is another vector given by  $(x, y, z) \times (x', y', z') = (yz' - zy', zx' - xz', xy' - yx')$ .

3. (8 pts) Design and implement an application that reads a string from the user (using a `Scanner`), and prints it one character per line. (Recall the `String` class has a method `charAt(i)` which returns the character at the  $i^{\text{th}}$  place in the string.)

4. (6 pts) Write a loop which prints out every other capital letter of the alphabet, starting at A. The output to the screen should be ACEGIKMQSUWY. You must write a loop, not simply print this string to the screen.

5. (6 pts) What is the output to the screen of the following code fragment?

```
int a[] [] = {{2,3,6},{0,4,5},{1,7,9}};  
for (int i=0; i<3; i++){  
    for (int j=0; j<3; j++){  
        System.out.print(a[j][i] + "\t");  
        System.out.println();  
    }  
}
```

Output:

6. (10 pts) Write a java program `CommandLine.java` which accepts parameters in the command line in the following format: the first parameter (passed in as `args[0]`) is the name of a student, while all the following parameters are integer grades of tests. Store the name in an appropriate `String`, and then store the rest of the command-line parameters in an `int` array `grades`. The output of your program should print out the name and the sum of the grades. (Recall that the method `Integer.parseInt` converts a number in `String` format to its `int` value.)

Here is a sample run: To compile the program, type

```
javac CommandLine.java
```

Then to run it, type

```
java CommandLine John 70 80 90 95 60
```

In this case, the output should be

```
The sum of John's grades is 395.
```

7. (10 pts) What is the output to the screen?

```
public class P{
    public static void main(String[] args){
        int[] a = {1,3,7,9,10};
        int[] b = {2,7,13,14};
        ff(a);
        ff(b);
        ff(a);
    }
    public static void ff (int[] ar){
        for (int i=0; i<ar.length; i++){
            if (ar[i]%2 == 0)
                System.out.print(ar[i]+" ");
            else
                ar[i] += 3;
        }
        System.out.println();
    }
}
```

Output:

8. (10 pts) Consider the following class `BankAccount`

```
public class BankAccount{
    private double balance;
    private int id;
    public BankAccount(double b, int i){
        balance = b; id = i; }
    public void deposit(double amount){
        balance += amount; }
    public void withdrawal(double amount){/*Fill in*/}
    public boolean overdraft(double amount){/*Fill in*/}
    public String toString(){
        return id + "\t" + balance;}
}
```

Below, write the methods `overdraft` and `withdrawal`. The `overdraft` method should return `true` if the account balance will become negative upon withdrawing the `amount` (and it should return `false` otherwise). The `withdrawal` method should call the `overdraft` method to determine its action: If there is no overdraft, simply withdraw the `amount` from the balance; while if there is an overdraft, do not perform the withdrawal, but print an error message to the screen.



10. (30 pts) **Circle the Roman numeral of the answer**

- (a) Which one of the following is *not* an example of software?
- i. operating system
  - ii. interpreter
  - iii. RAM
  - iv. Java applet
- (b) Which of the following is equal to the `double` value 2.5 in Java?
- i. `10/4`
  - ii. `2+1/2`
  - iii. `(double)(5/2)`
  - iv. `5.0/2.0`
- (c) What does the expression `(int)(Math.random()*6)` represent?
- i. a random integer between 0 and 5 inclusive
  - ii. a random integer between 1 and 6 inclusive
  - iii. a random floating point number between 0.0 and 6.0
  - iv. this always evaluates to 0
- (d) If `s` and `t` are `String` objects, then which of the following is a boolean expression tests to see if `s` and `t` represent the same word?
- i. `s==t`
  - ii. `s=t`
  - iii. `s.equals(t)`
  - iv. `s+t`
- (e) Which of the following is an infinite loop?
- i. `while (x>0); {x--;}`
  - ii. `while (x>0) {x--;}`
  - iii. `for (int a=1; a<15; a+=2){x+=3;}`
  - iv. `do{x=x+i; i++;} while(x>15 && i<20);`

- (f) What is the value of `Math.pow(2,3)`?
- 6.0
  - 8.0
  - 9.0
  - 5.0
- (g) What is the output to the screen?
- ```
boolean b = true; int x = 5;
do{ System.out.print((x+2)+" "); b = (x==5); x++;}
while (b);
```
- 7 7
  - 7 8
  - 7
  - nothing
- (h) If `b` is an `int` variable with value 10, and `c` is a `boolean` variable with value `true`, which of the following boolean expressions is false?
- `!c`
  - `b<10 || c`
  - `b==10`
  - `b>=5 && c`
- (i) Which statement instantiates a new `Scanner` object which scans input from the user?
- `Scanner scan = new Scanner (System.in);`
  - `new Scanner = User.input;`
  - `Scanner = new Scanner (System.in);`
  - `Scanner scan = Scanner.getNewSystemInput();`
- (j) Which `char` value is equal to `'Z'+2`?
- `'A'`
  - `'B'`
  - `'Z'`
  - none of the above