## CS 180 Fall 2008 Exam I

There are 20 multiple choice questions. Each one is worth 2 points. There are 3 programming questions worth a total of 60 points.

Answer the multiple choice questions on the bubble sheet given and the programming questions on the exam booklet.

Fill in the Instructor, Course, Signature, Test, and Date blanks. For "Instructor" put your **RECITATION INSTRUCTOR'S LAST NAME GIVEN BELOW**. For "Course" put CS 180. For "Test" put Exam 1.

Fill in the bubbles that correspond to your name, section and Student ID in the bubble sheet. For your section number, use the **SECTION NUMBER** for your lab and project turn in. Consult the following list:

0101 THU 07:30 LWSN 1106 Salman Pervez
0201 FRI 07:30 LWSN B134 Cheng Wang
0301 FRI 03:30 LWSN B134 Salman Pervez
0401 FRI 04:30 HAAS G066 Srinivas Pasupuleti
0501 FRI 09:30 LWSN B134 Ashish Gandhe
0601 FRI 02:30 LWSN 1106 Ashish Gandhe

For your student ID, use the 10 digit ID number on your student ID card. DO NOT USE YOUR SOCIAL SECURITY NUMBER!

Exams without names will be graded as zero. Only the answers on the bubble sheet will be counted. The questions will be discarded.

Recitation Start Time

Recitation TA's Name

Student Last Name

Student First Name\_\_\_\_\_

## Part I. Multiple Choice Questions (2 points each):

- 1. Which of the following statements regarding memory is correct?
  - (a) Main memory is used to store source files.
  - (b) A byte is a unit of memory. One byte can be used to represent 512 different values.
  - (c) Programs in machine language are copied from main memory to auxiliary memory before they can execute.
  - (d) Auxiliary memory is nonvolatile.
- 2. Which of the following statements is NOT correct?
  - (a) The Java statement int value = "10"; leads to a compile time error.
  - (b) The Java statement int value = Integer.parseInt(10); leads to a compile time error.
  - (c) The Java statement int value = 10.8; leads to a compile time error.
  - (d) The Java statement int value = Integer.parseInt("String"); leads to a compile time error.
- 3. Which of the following is NOT a valid identifier name in Java?
  - (a) 5silly
  - (b) silly\$
  - (c) silly5
  - (d) \$silly
- 4. What output does the following code snippet produce?

```
System.out.println("This \tis a \"funny\"" + "\nstring.");
(a) This is a "funny"
string.
(b) This is a "funny" string.
(c) This is a funny string.
(d) This
is a "funny" string.
```

5. Given the variable types declared below, which of the following variable assignments is illegal in Java?

```
byte b;
int i;
double d;
char c;
(a) i = b;
(b) b = (byte) i;
(c) i = c;
(d) i = d;
```

6. What is the output of the following program?

```
public class IntChar
 {
    public static void main (String[] args)
    {
       char c = 'C';
       int cValue = c;
       char newC = (char) cValue;
       if (newC == c)
        {
           System.out.println("True");
       }
       else
        {
           System.out.println("False");
        }
    }
 }
(a) False
(b) True
(c) True False
(d) The program has syntax errors.
```

7. Given the variable strinitialized below, what is the value of str.charAt(str.length() - 2)?

String str = "Java exams are relaxing";
(a) 'i'
(b) This statement produces an error.
(c) 'g'
(d) 'n'

- 8. Which of the following statements does NOT really do what you want it to?
  - (a) if (car1 == car2) { . . . } (test if two objects, car1 and car2, of class Car are the same)
  - (b) if (color1 == color2) { . . . } (test if two enumerated variables, color1 and color2, of an enumerated data type, Color, are the same)
  - (c) if  $(i == j) \{...\}$  (test if two integers, i and j, are the same)
  - (d) if (sl.charAt(0) == s2.charAt(0)) (test if the first character in two strings, s1 and s2, are the same)
- 9. What is stored in the variable result after the following code fragment has been executed?

```
int score = 75;
 if (score >= 90)
 {
    result = 'A';
 }
 else if (score >= 60)
 ł
    if (score >= 80)
    {
       result = 'B';
    }
    else if (score >= 70)
    {
       result = 'C';
    }
    if (score \geq 60)
    {
       result = 'D';
    }
 }
 else
 ł
    result = 'F';
 }
(a) B
(b) F
(c) D
(d) C
```

- 10. Which looping process in Java checks the test condition at the end of the loop?
  - (a) do-while
  - (b) for
  - (c) while
  - (d) No looping process in Java checks the test condition at the end

- 11. Instance variables of a class should be declared private because ...
  - (a) It supports information hiding. The programmer does not need to know the implementation detail.
  - (b) They can then be accessed from public methods of other classes.
  - (c) They should not be accessible from anywhere.
  - (d) They can then be accessed from private methods of other classes.
- 12. What is the output of the following program?

```
public class IfSwitch
 {
    public static void main (String[] args)
    {
       char criterion = 'q';
       if (criterion == 'q' || criterion == 'Q')
       {
          System.out.println("Exiting...");
       }
       else
       {
          System.out.println("Keep playing!");
       }
       switch (criterion)
       {
          case 'q':
          case 'Q':
                   System.out.println("Goodbye!");
          default:
                   System.out.println("Enjoy!");
       }
    }
 }
(a) Exiting...
  Keep playing!
  Goodbye!
  Enjoy!
(b) Keep playing!
  Enjoy!
(c) Exiting...
  Goodbye!
  Enjoy!
(d) Exiting...
  Goodbye!
```

- 13. Which of the following is true about method parameters?
  - (a) The actual parameter values need not be provided in the same order as the corresponding formal parameters.
  - (b) It is not possible for a method to have a local variable and a formal parameter with the same name.
  - (c) An integer value cannot be passed as a method's parameter when a value of double type is expected.
  - (d) When passing parameters of primitive type, only the memory address is copied.
- 14. Which of the following describes the correct outcome given the code below?

```
switch (grade)
 {
    case 'A':
              System.out.print('A');
    case 'B':
              System.out.print('B');
             break;
    case 'C':
              System.out.print('C');
    case 'D':
              System.out.print('D');
    case 'F':
              System.out.print('F');
             break;
    default:
              System.out.print("None");
 }
(a) when grade = 'F', output is "FNone"
(b) when grade = 'C', output is "CDF"
(c) when grade = 'A', output is "A"
(d) when grade = 'B', output is "BC"
```

15. Which of the following is true about accessor and mutator methods?

- (a) Accessor methods are used to access values of private variables.
- (b) An accessor method is usually of void return type.
- (c) A mutator method typically does not have any parameters.
- (d) A mutator method only makes changes to its local variables.

- 16. Which of the following is true about methods?
  - (a) A private method can not be invoked from public methods of the same class.
  - (b) A method can take any number of parameters.
  - (c) A method of void type can return an integer value.
  - (d) A method can only return values of primitive type.
- 17. Which of the following statements is true?
  - (a) a continue statement within a loop ends the loop.
  - (b) a break statement within a loop ends its current iteration.
  - (c) a break statement within a loop ends the loop.
  - (d) a break statement can only appear with a loop.
- 18. What is the output of the following program?

```
public class OneLoop
{
    public static void main (String[] args)
    {
        for (int i = 0; i < 10; ++i)
        {
            ++i;
        }
        System.out.println(i);
    }
}
(a) 20
(b) The program has a syntax error.
(c) 10
(d) 5</pre>
```

19. Examine the following code:

```
int count = 1;
while ( count < 5 )
{
    System.out.print( count + " " );
}
System.out.println( );</pre>
```

What does this code print on the monitor?

(a) 1 2 3 4
(b) 1 1 1 1 1 1 1 1 1 1 1 . . . .
(c) 1 2 3 4 5
(d) 2 3 4

20. Given the class definition of Person below:

```
public class Person
{
    public String middleName = "No middle name." ;
    private String dateOfBirth = "Jan 1, 1111";
    public void Change ()
    {
        middleName = "M";
        dateOfBirth = "Aug 5, 2006";
    }
}
```

Which of the following statements is true?

- (a) It is syntactically wrong to modify either of the two variables in the body of Change().
- (b) Both middleName and dateOfBirth can be modified by Change().
- (c) It is syntactically correct to modify middleName in Change(), but it is not correct to modify dateOfBirth.
- (d) It is syntactically correct to modify dateOfBirthin Change(), but it is not correct to modify middleName.

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## Part II. Programming Questions (60 points total):

1. (20 points) A square pyramid is a pyramid with a square base. It is a pentahedron. The pyramid is defined with one side of the square base, **a**, and a height, **h**. Write a Java class, Pyramid, that prompts a user first to 'Enter the side of the square base for the pyramid:', then to 'Enter the height for the pyramid.'. The program should proceed to compute the surface area and the volume of the pyramid using the following formulas:

$$S = a(a + \sqrt{a^2 + 4h^2})$$

$$V = \frac{1}{3}a^2h$$

The Pyramid class should print the side, height, surface area, and volume of the pyramid. You may assume all quantities are of the double type.

Note: Write your code on the next page. It must be a complete class.

```
Solution for programming question 1:
import java.util.*;
public class Pyramid
{
    public static void main(String arg[])
    {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter the side of the square base for the pyramid:
        double side = s.nextDouble();
        System.out.print("Enter the height for the pyramid: ");
        double height = s.nextDouble();
        double sarea = side * ( side +
                              Math.sqrt(side * side + 4 * height * height));
        double volume = side * side * height / 3.0;
        System.out.println("Side of pyramid = " + side);
        System.out.println("Height of pyramid = " + height);
        System.out.println("Surface Area of pyramid = " + sarea);
        System.out.println("Volume of pyramid = " + volume);
    }
}
```

2. (20 points) Write a Java class, call it DivisiblePair, which prompts the user for an integer number, n, and prints out all pairs of numbers (i, j) in the range of 1 to n where i is divisible by j. Note: i and j must be different numbers.

Below is a sample execution. Your output sequence must match the sample output for the given input.

Enter an integer number: 6
All divisible pairs are:
(2,1)
(3,1)
(4,1)
(4,2)
(5,1)
(6,1)
(6,2)
(6,3)

Note: Write your code on the next page. It must be a complete class.

```
Solution for programming question 2:
import java.util.*;
public class DivisiblePair
{
    public static void main(String args[])
    {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter an integer number: ");
        int n = s.nextInt();
        int i = 0;
        int j = 0;
        for (i = 1; i <= n; i++)</pre>
        {
             for (j = 1; j <= i/2; j++)</pre>
             {
                 if (i != j && i%j == 0)
                 {
                       System.out.print("(" + i + "," + j + ")\n");
                 }
            }
        }
   }
}
```

3. (20 points) Write the definition of a class Rectangle to represent a rectangle. Note that a rectangle can be fully described by two dimensions, length and width.

Your class should satisfy the following requirements:

- (a) The class must provide accessor methods to access the values of the two dimensions
- (b) The class must provide mutator methods to change the values of the two dimensions.
- (c) The class must provide the following methods:
  - i. computeArea: computes and returns the area of the rectangle.
  - ii. computePerimeter: computes and returns the perimeter of the rectangle. Note: Perimeter is the sum of all four sides of the rectangle.
- (d) Your class must use appropriate access modifiers (public/private) for instance variables and methods. You may assume that the dimensions of the rectangle are integers.

Note: Write your code on the next page. It must be a complete class.

```
Solution for programming question 3:
public class Rectangle
{
    private int length; //Length of the rectangle
    private int width;
                            //Width of the rectangle
    /***
    Access the value of the width of the rectangle
    ***/
    public int getWidth() {
        return width;
    }
    /***
    Access the value of the length of the rectangle
    ***/
    public int getLength() {
        return length;
    }
    /***
    Set the value of the width of the rectangle
    ***/
    public void setWidth(int wid) {
        width = wid;
    }
    /***
    Set the value of the length of the rectangle
    ***/
    public void setLength(int len) {
        length = len;
    }
    /**
    Compute and return the area
    ***/
    public int area() {
        return length * width;
    }
    /**
    Compute and return the perimeter
    ***/
    public int perimeter() {
        return 2 * (length + width);
    }
```

}