ComS 207: Programming I
Midterm 1, Tue. Sep 18, 2007

Student Name:
Student ID Number:
Recitation Section:

1. **True/False Questions (10 x 1p each = 10p)**

   (a) This midterm exam is very easy!   TRUE / FALSE

   (b) In Java the return value of a method can be ignored.   TRUE / FALSE

   (c) Each Java method must use all of its input arguments.   TRUE / FALSE

   (d) A class can have more than one constructor with the same name. TRUE / FALSE

   (e) The new operator can be used to create a reference variable   TRUE / FALSE
       to a primitive data type such as 'int'.

   (f) The Scanner class is located in the java.scan library.   TRUE / FALSE

   (g) A Java Class can be named 'Class'.   TRUE / FALSE

   (h) System.in is a reserved word in Java.   TRUE / FALSE

   (i) Both a char and a String can be used to store the letter C.   TRUE / FALSE

   (j) For each class the programmer must define a toString() method. TRUE / FALSE

2. **Short Answer Questions (5 x 2p each = 10p)**

(a) What is a Java class?

(b) What is instance data?

(c) What is the difference between float and double?

(d) What is the difference between a compiler and an interpreter?

(e) What is the meaning of this code snippet?
    ```
    Grade myGrade = new Grade("ComS 207", "F");
    ```

3. **Arithmetic Expressions (5 x 3p each = 15p)**

Rewrite the following arithmetic expressions using snippets of Java code. You can assume that the named variables have already been defined to be of type double.

(a) $z = \sqrt{x^2 + y^2}$

(b) $z = \frac{4}{3}\pi r^3$

(c) $z = \frac{1}{c} - \frac{x}{3}$

(d) $z = \sqrt{1 + tan^2(x)}$

(e) $z = \frac{1}{\sqrt{2\pi s^2}} exp^{-\frac{(x-m)^2}{2s^2}}$

4. **Bug Chase (5p + 10p = 15p)**

   Find all bugs in the following programs. Circle the location of each bug and write with words what is wrong with the code at that location.

   (a) (5p)

```
======= File: byte.java ========
Public classs byte
{
   Private int maine (String args) {
      String  = new Strong("Jonathan "Jon" Smith");
      system.out.println("My name is ", s.substring(1, s.lenght()))));
   }
}
```

   (b) (10p)

```
======= File: pizza.java ========
Public classs pizza
{
   Private name, address;

   void pizza(String pName, pAddress) {
      pName = name;
      pAddres = address
      return name;
   }

   Private deliver() {
      system.out.println("Deliver 1 ", pName, "to this address ", pAddress);
   )
}
========= File: pizzaria.java ==========
Public classs piazzaria;
{
   Private int maine (String args) {
      pizza Pizza = new Pizza("Pepperoni"):
      pizza.delivery("100 Tornado Street");
   }
}
```

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5. Expressions and Assignments (10 x 2p each = 20p)

For each of the following, write down the value that will be stored in result

```
double result;
int num1 = 4, num2 = 11, num3 = 3;
double val1 = 3.0, val2 = 10.0, val3 = 2.0;
```

(a) result = num2%num1;

(b) result = (int)val3 - num2+num1;

(c) result = num3 / val2+num1;

(d) result = num2%num3/num1;

(e) result = val2 / num1 + num2*num3;

(f) result = (float) (val2/ (num1 - num3)*num1);

(g) result = ((int)val2- (num1 % num2))/num3;

(h) result = val3 * ((num1 + num2)* num3);

(i) result = 1.0*num2 / --num3;

(j) result = (num1++ / --num2)/val1;

6. **Programming Projects (4 x 15p each = 60p)**

   (a) Metric System (15p)

   Write a complete Java program which asks the user to enter a double value which represents kilometers per second (km/s). The program must then convert this value to miles per hour (miles/hour) and print that on the screen. Round your result so that there are no decimal points.

   Hint: 1 mile = 5280ft, 1km = 1000m, 1m = 3.28ft

   Sample output:

   Please enter km/s : 0.04
   This is equal to 89 miles/hour.

(b) Painting Problem (15p)

Write a complete Java program which calculates how much paint is required in order to paint a room. The program must prompt the user to enter the width, length, and height of the room (in feet) as well as the average paint coverage (in sq ft/gallon). The program must then calculate and print the following values: 1) room volume (in cubic feet); 2) total wall area (in sq feet); 3) gallons of paint required to paint all six walls; and 4) number of five-gallon containers that you must purchase to finish the job.

(c) Phone Numbers (15p)

Write a complete Java program that asks the user to enter a 10 digit phone number. You can assume that the user will always enter the ten digits without any spaces or punctuation signs (e.g., 5152945555). The program must then format and print three different instances of this number: 1) full number with the area code separated by '(' and ')' and a dash between the next three digits and the last four; 2) local number - no area code but with a dash between the first three and the last four digits; 3) campus number - only the last 5 digits with a dash after the first one.

Sample output:

Please Enter a 10 digit phone number: 5152945555

Full : (515) 294-5555

Local : 294-5555

Campus : 4-5555

(d) Powerball Lottery (15p)

"Powerball is a lotto game which is a combined large jackpot game and a cash game. We draw five white balls out of a drum with 55 balls and one red ball out of a drum with 42 red balls." [From www.powerball.com]

Write a complete Java program which draws random numbers for the Powerball lottery for a random day of the year. You can assume that all months have at most 28 days. Also, you can assume that its is OK if one and the same number is drawn more than once. Print the numbers on one line in the following format:

Sample Output: Draw Date: 9/15/2007   Numbers: 13, 16, 27, 48, 51   Powerball: 21

That's it. Good Luck!

Question	Max	Score
True/False	10	
Short Answer	10	
Arithmetic Expressions	15	
Bug Chase	15	
Expressions	20	
Metric System	15	
Painting Problem	15	
Phone Numbers	15	
Powerball Lottery	15	
TOTAL:	130	