CS 180 Problem Solving and OO Programming

Fall 2011
Recitation Week 3. September 5-9, 2011

Problem 1:

Compute the value of the each expression in the table below. Assume the following declarations. Indicate the type of the result. Also indicate if an expression is invalid.

int a=7, b=3, c=-5, d=2; **double** x=5.0, y=3, z=4.78, r=4.4;
String p="Hello", q="Hello";

Expression	Value
a/b	2
a%b	1
a+b*c	-8
a<<2	28 (left shift)
b>>2	0 (right shift, the sign is protected)
c>>2	-2 (right shift, the sign is protected)
c<<2	-20 (left shift)
~a	-8 (1's Complement)
x/y	1.6666666666666667
x/b	1.6666666666666667
p.charAt(2);	l
p==q	true
a>b && b>c	true
a<b|| b>c	true
y+2==x	true
Math.pow(a, d)	49
Math.round(z)	5
Math.round(r)	4
Math.random()	A random number in the range 0 to 1
Math.sin(Math.PI)	~0 (almost zero, but not exactly because of the round-off)

Problem 2:

We are required to write a Java program that simulates a very simple checkout counter at a grocery store. The counter **knows** the current price of one item, say tomatoes, per pound. It can perform only one transaction. The checkout counter can do three things.

1. Given the net weight in pounds of the tomatoes purchased, it can compute the **total price** to be paid by a customer.
2. Given the amount paid by the customer, it can generate the amount of **change** to be returned to the customer.
3. It prints a **receipt** as follows:

Tomatoes purchased	3.45 pounds
Unit price	$1.99 per pound
Net price	$6.83
Tax (7%)	$0.48
Total price	$7.30
Cash tendered	$10
Change	$2.70

Assume that the user types in the **weight** of the tomatoes purchased and the **cash** tendered. The checkout counter then displays the **receipt** as above.

Suggested steps to solve the problem:

1. Read the problem statement and understand what is required of the program. Resolve any ambiguities.
2. Design your program: What would you name the class? [Hint: What object are we simulating?]
3. What should be the attributes in each class? What name you wish to assign to each attribute? And what is its type?
4. What methods should the class have?
5. What are the inputs to each method and what is its output?
6. What object will be created? What would ask of this object?
7. What should be the sequence of actions in the `main()` method?
8. Code your design by writing the classes designed and then compile and test.

<End of Problems for Week 3>

```java
/*The following program gives one solution way to the problem. Some of the *things in
*the program can be written in many different ways.
*/
import java.util.*;
public class ItemCounter {
 double weight;
 double unit_price;
 double tax;

 public ItemCounter(double w,double u,double t){
  weight=w;
  unit_price=u;
  tax=t;
 }

 public void setWeight(double w){
  weight=w;
 }
 public void setUnitPrice(double u){
  unit_price=u;
 }

 public void setTax(double t){
  tax=t;
 }

 public double getWeight(){
  return weight;
 }
 public double getUnitPrice(){
  return unit_price;
 }
 public double computeNetPrice(){
  return weight*unit_price;
 }
 public double computeTotal(){
  double netprice=computeNetPrice();
  return netprice+netprice*tax/100;
 }
 public double computeTax(){
  double netprice=computeNetPrice();
  return netprice*tax/100;
 }
 public double computeChange(double cash, double total){
  return cash-total;
 }

 public static void main(String[] args){
  double cash,total,weight;

  //Create object sc from Scanner class to get input from the console
  Scanner sc=new Scanner(System.in);
  System.out.println("Enter the weight for the item");
```

```
  //get the weight of the object as the input user provided
  weight=sc.nextDouble();

  //Create an  object, tomatoes from the Item class
     ItemCounter tom=new ItemCounter(weight,1.99,7);
  //
  //Compute the total amount
  total=tom.computeTotal();


  //The amount of the cash given by the user
  System.out.println("Cash tendered");
  cash=sc.nextDouble();
  //Print the required output and compute the required field by using
  //the methods provided above
  System.out.printf("Tomatoes purchased\t %.3f \n",tom.getWeight());
  System.out.printf("Unit Price        \t %%%.3f \n",tom.getUnitPrice());
  System.out.printf("Net Price         \t %%%.3f \n",tom.computeNetPrice());
  System.out.printf("Tax 7%%           \t %%%.3f \n", tom.computeTax());
  System.out.printf("Total Price       \t %%%.3f \n", total);
  System.out.printf("Cash Tendered     \t %%%.3f \n",cash);
  System.out.printf("Change            \t %%%.3f \n",tom.computeChange(cash, total));
 }
}
```