Question 1. [5 points] What output is printed by the following code (which begins on the left and continues on the right)?

17, 42

Question 2. [5 points] What output is printed by the following code (which begins on the left and continues on the right)?

```
public class Q2 {
                                          public static void main(
  private int value;
                                               String[] args) {
                                            Q2 a = new Q2(17);
  public Q2(int v) {
                                            Q2 b = new Q2(42);
    value = v;
                                            mystery(a, b);
  public static void mystery(
                                            System.out.printf("%d,%d\n",
      Q2 x, Q2 y) {
                                               a.value, b.value);
    Q2 \text{ tmp} = x;
                                          }
    x = y;
                                        }
    y = tmp;
```

assignments to x and y parameters do not affect a and b in main 17,42

Question 3. [10 points] Write statements to read two sets of (x,y) coordinates from the user, calculate the distance between the two sets of coordinates, and print the result. The distance between two points is $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$. You can use Math.sqrt to compute the square root of a double value.

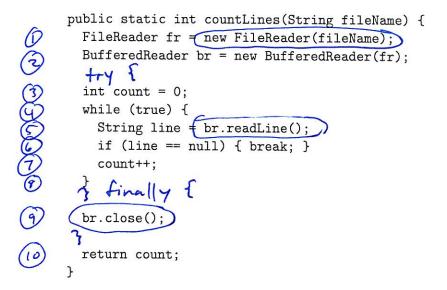
donble x1, y1, x2, y2; Scanner keyboard = new Scanner (System.in); x1 = keyboard. next Donble (); y1 = keyboard. next Donble (); x2 = keyboard. next Double (); y2 = keyboard. next Double (); double xdiff = x2 - x1, ydiff = y2 - y1; double dist = Mash. sqrt(xdift * xdiff + ydiff * ydiff); System.out. println (dist); Question 4. [10 points] Identify, explain, and correct all of the problems with the following class

definition, which begins on the left and continues on the right.

public class Point { private getX() { instance fields should be private double x; return(x); double y; / private getY() { x = 0; y = 0; } Point(x,y) { (double) return(y); this. x = x; vs. fields

this. y = y;

Question 5. [10 points] Consider the following method:



(a) At which lines in this method could an IOException or FileNotFoundException occur?

(1), (5), and (9)

(b) As written, this method neither declares itself as throwing IOException nor attempts to handle IOException using try/catch. Which of these do you think would make more sense? Explain briefly.

The method should throw IOException.

try/catch only makes sense if it is possible to do something to recover from the exception.

(c) Explain how the method might open a file, but then not make an attempt to close it.

br. readline () could throw on IOException

(d) Explain how to guarantee that the method will make an attempt to close the file if it is opened.

add try/finally as shown above

Question 6. [10 points] Implement the CountBy class so that the following JUnit tests will pass. The idea is that when a CountBy object is created, its internal counter is set to zero, and a parameter to the constructor sets an integer value that is the multiple by which the object will count. Each time the next method is called, the internal counter should be increased by the multiple. Each time the get method is called, it should return the object's current counter value.

```
CountBy by2 = new CountBy(2);
 CountBy by7 = new CountBy(7);
 assertEquals(0, by2.get());
 assertEquals(0, by7.get());
 by2.next();
 assertEquals(2, by2.get());
 by7.next();
 by7.next();
 assertEquals(14, by7.get());
public class Count By f
private int incr, count;
      public Count By (int incr) {
this. incr = incr;
                 this. count = 0;
      public int get () {
return count;
      public void next () {
    count += incr;
```

Question 7. [10 points] For the Point3D class shown below, circle the fields and methods that a concrete class Vector extending Point3D would inherit from Point3D.

Also, list all the methods that subclass Vector has to instantiate to be considered a valid concrete class.

```
public abstract class Point3D {
                                       private int getX_2() {
 public
            int x;
                                         return x*x;
 public
                                        7
            int y;
 public
            int z;
                                       private int getY_2() {
 public A() {
                                         return y*y;
   x = 0;
   y = 0;
   x = 0;
                                       private int getZ_2() {
                                         return z*z;
 public A(int x, int y, int z) {
   this.x = x;
                                       public abstract double getLength()
   this.y = y;
   this.z = z;
                                       public abstract double getNormX();
                                       public abstract double getNormY();
 public int getX() {
   return x;
                                       public abstract double getNormZ();
 public int getY() {
                                     public class Vector
   return y;
                                          extends Point3D {
                                       // what methods must
                                       // this class define?
 public int getZ() {
                                     7
   return z:
     inhvited
```

linerited by Vector (except constructors subclusses must define their own constructor(s))

Vector must implement these concretely.