Assignment #2: Due Wednesday, Feb. 24, at 5:00 PM, PST via email. Be sure to include all source code listings and at least one sample run for each question.

1. Write a program, which prints a table of contents. Use the following data structure:

```
public class TocEntry
{
      // Specify the needed methods

private String chapter;
private int page;
}
```

In your driver/test program define:

```
public final int TOCSIZE = 100;
TocEntry toc[] = new TocEntry[TOCSIZE];
int toc_curlen = 0;
```

Next develop the necessary code, in your TocEntry class, to read in a chapter name and page number until "****" is entered. From this generate an output, e.g.:

```
My Story Starts..............1
Growing up...................35
Conquering the World........103
Winding Down................186
```

Sample run:

```
% java useTocEntry

Enter chapter title: Camelot
Enter starting page number: 1

Enter chapter title: King Arthur's Court
Enter starting page number: 3

Enter chapter title: Knights of the Table Round
Enter starting page number: 8

Enter chapter title: Sir Dinadan the Humorist
Enter starting page number: 12

Enter chapter title: An Inspiration
Enter starting page number: 14

Enter chapter title: The Eclipse
Enter starting page number: 23

Enter chapter title: A Postscript by Clarence
Enter starting page number: 274

Enter chapter title: ****


Camelot.....................................1
King Arthur's Court.........................3
Knights of the Table Round..................8
Sir Dinadan the Humorist....................12
An Inspiration..............................14
The Eclipse.................................23
A Postscript by Clarence....................274
```

2. Given:

```
public class Point
{
        public Point(double xx, double yy, double zz)
        {
        x = xx;
        y = yy;
        z = zz;
        }

        public double getX()
        {
        return x;
        }

        public double getY()
        {
        return y;
        }

        public double getZ()
        {
        return z;
        }

        public double distance(Point p)
        {
        return Math.sqrt((x - p.x) * (x - p.x)
               + (y - p.y) * (y - p.y) + (z - p.z) * (z - p.z));
        }
private double x, y, z;
}
```

```
public class Sphere
{
      public Sphere(Point cntr, double rad)
      {
      center = cntr;
      radius = rad;
      }

      public Point getCenter()
      {
      return center;
      }

      public double getRadius()
      {
      return radius;
      }

private Point center;
private double radius;
}
```

a. Write toString() and equals() methods for class Sphere. Test your methods, in a driver program, by creating two separate Spheres with two separate centers at (1,2,3) each with a radius of 5.

b. Eplain how to determine if objects are equal. Next, show that neither the centers nor the Spheres are '==' but that they are equals(). Finally, use toString() to output the salient properties of one of the Spheres.

c. Create a derived class, VSphere which includes a method to calculate the volume of a sphere; write a test driver & test it.