Homework Turnin

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Section:	6G
Course:	TJHSST APCS 2016-17
Assignment:	08-07
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Turnin Successful!

The following file(s) were received:

Polynomial_Driver.java (4457 bytes)

```
1.  //Name:   Date:
2.  //modeling a polynomial using a treeMap
3. import java.util.*;
4. public class Polynomial_Driver
5. {
6.    public static void main(String[] args)
7.    {
8.       Polynomial poly = new Polynomial();
9.       poly.makeTerm(1, -4);
10.      poly.makeTerm(3, 2);
11.      poly.makeTerm(0, 2);
12.      System.out.println(poly.toString());
13.      double evaluateAt = 2.0;
14.      System.out.println("Evaluated at "+ evaluateAt +": " +poly.evaluateAt(evaluateAt));
15.
16.      Polynomial poly2 = new Polynomial();
17.      poly2.makeTerm(1, -5);
18.      poly2.makeTerm(4, 2);
19.      poly2.makeTerm(0, -3);
20.      poly2.makeTerm(2, 1);
21.      System.out.println(poly2.toString());
22.
23.      System.out.println(poly.add(poly2));
24.      System.out.println(poly.multiply(poly2));
25.   }
26. }
27. interface PolynomialInterface
28. {
29.   public void makeTerm(Integer exp, Integer coef);
30.   public double evaluateAt(double x);
31.   public Polynomial add(Polynomial other);
32.   public Polynomial multiply(Polynomial other);
33.   public String toString();
34. }
35.
36. class Polynomial implements PolynomialInterface
37. {
38.   Map<Integer, Integer> map;
39.   public Polynomial()
40.   {
41.      map = new TreeMap<Integer, Integer>();
42.   }
43.   public void makeTerm(Integer exp, Integer coef)
44.   {
45.      if(map.get(exp)==null)
46.         map.put(exp, coef);
47.      else
48.      {
49.         int coefficient = map.get(exp);
50.         map.put(exp, coef+coefficient);
```

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51.         }
52.      }
53.      public double evaluateAt(double x)
54.      {
55.         double value = 0.0;
56.         Set<Integer> set = map.keySet();
57.         Iterator it = set.iterator();
58.         while(it.hasNext())
59.         {
60.            int exponent = Integer.parseInt(it.next()+"");
61.            value+=Math.pow(x,exponent)*map.get(exponent);
62.         }
63.         return value;
64.      }
65.      public Polynomial add(Polynomial other)
66.      {
67.         Polynomial add = new Polynomial();
68.         Set<Integer> set = map.keySet();
69.         Iterator it = set.iterator();
70.         while(it.hasNext())
71.         {
72.            int exponent = Integer.parseInt(it.next()+"");
73.            if(map.get(exponent)!=null&&other.map.get(exponent)!=null)
74.               add.makeTerm(exponent, map.get(exponent)+other.map.get(exponent));
75.            else
76.               add.makeTerm(exponent, map.get(exponent));
77.         }
78.         Set<Integer> set2 = other.map.keySet();
79.         Iterator it2 = set2.iterator();
80.         while(it2.hasNext())
81.         {
82.            int exponent2 = Integer.parseInt(it2.next()+"");
83.            if(!set.contains(exponent2))
84.               add.makeTerm(exponent2, other.map.get(exponent2));
85.         }
86.         return add;
87.      }
88.      public Polynomial multiply(Polynomial other)
89.      {
90.         Polynomial multiply = new Polynomial();
91.         Set<Integer> set = map.keySet();
92.         Set<Integer> set2 = other.map.keySet();
93.         Iterator it = set.iterator();
94.
95.         while(it.hasNext())
96.         {
97.            Iterator it2 = set2.iterator();
98.            int exp = Integer.parseInt(it.next()+"");
99.            while(it2.hasNext())
100.           {
101.              int exp2 = Integer.parseInt(it2.next()+"");
102.              multiply.makeTerm(exp+exp2, map.get(exp) * other.map.get(exp2));
103.           }
104.        }
105.        return multiply;
106.     }
107.     public String toString()
108.     {
109.        String display = "";
110.
111.        Set<Integer> set = map.keySet();
112.        Iterator it = set.iterator();
113.        while(it.hasNext())
114.        {
115.           int exponent = Integer.parseInt(it.next()+"");
116.           if(map.get(exponent)==0);
117.           else if(map.get(exponent)==1)
118.           {
119.              if(exponent>1)
120.                 display = "x^" + exponent + " + " + display;
121.              else if(exponent==1)
122.                 display = "x + " + display;
123.              else
124.                 display = map.get(exponent) + display;
125.           }
126.           else if(map.get(exponent)==-1)
127.           {
128.              if(exponent>1)
129.                 display = "-x^" + exponent + " + " + display;
130.              else if(exponent==1)
131.                 display = "-x + " + display;
```

```
            else
               display = map.get(exponent) + display;
         }
         else
         {
            if(exponent>1)
               display = map.get(exponent) + "x^" + exponent + " + " + display;
            else if(exponent==1)
               display = map.get(exponent) + "x + " + display;
            else
               display = map.get(exponent) + display;
         }
      }
      return display;
   }
}
/*
expected output
   2x^3 + -4x + 2
   10.0
   2x^4 + x^2 + -5x + -3
   2x^4 + 2x^3 + x^2 + -9x + -1
   4x^7 + -6x^5 + -6x^4 + -10x^3 + 22x^2 + 2x + -6
 */
```