TOPIC 7 EXERCISES

Tracing Exercises

1. For each part of this exercise, assume that the array a starts with the values in the Figure. For each of the program segments, show what values are stored in a after executing the segment. Use this declaration for each part:

```
int[] a = new int[6];
int i,j,q;
```

a

0	7
1	-1
2	0
3	4
4	15
5	3

Figure: Array a for Exercise 1

```
(a)   a[4] = a[2] + a[2 + 1];          (b)   j = 4;
      a[0] = a[6 - 1] + a[6 - 2];            a[3] = a[j] + a[j - 1];
                                             a[2] = a[j + 1];


(c)   i = 1;                           (d)   for (int i=0; i < 5; i++)
      j = i + 2;                                   a[i] = a[i + 1];
      a[i] = a[j] + a[j + 1];
```

2. Show what is stored in the x and y arrays after the following program segment is executed. Also show what is printed. Assume that the arrays have the initial values in Figure 7-11.

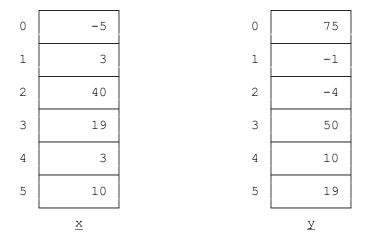| x			y	
0	-5		0	75
1	3		1	-1
2	40		2	-4
3	19		3	50
4	3		4	10
5	10		5	19

x   y

Figure: Arrays x and y for Exercise 2

```
int x = new int[6];
int y = new int[6];
...
x[3] = x[3] + x[5];
y[1] = y[2] + y[3];
x[5] = x[0] + x[2];
x[1] = x[4] + x[x[1]];
for (int i = 0; i <= 5; i++) {
    if (x[i] > 10)
        System.out.println(x[i]);
    if (x[i] < 50)
        System.out.println(y[i]);
}
```

3. Show what values are stored in the x array after executing this program segment. Also show what is printed.

```
int[] x = {2,2,1,3,1};
int y;

y = x[1] + 1;
System.out.println(y);
x[4] = 1;
System.out.println(x[x[4]]);   // be careful of the subscript here
y--;
System.out.println(y + " " + x[y]);
```

4. Show what is printed by each of these programs. If the program reads in data, the values are shown after it:

```
(a) public class prob7_4a {
        public static void main(String[] args)
        {
            int i,k,m;
            int[] a = new int[9];

            for (int p = 0; p <= 8; p++)
                a[p] = 0;
            m = 1;
            k = 5;
            for (i = -2; i <= 2; i++) {
                a[i + k] = 20 * i;
                m = -m;
                k += m;
                System.out.println("k = " + k + " m = " + m);
            }
            System.out.println("i = " + i + "  k = " + k + " m = " + m);
            for (int j = 0; j <= 8; j++)
                System.out.println(j + " " + a[j]);
        }
    }
```

```
(b) import java.util.Scanner;
    public class prob7_4b {
        public static void main(String[] args)
        {
            double[] a = new double[20];
            double[] b = new double[20];
            double[] large = new double[20];
            int num;
            Scanner kybd = new Scanner(System.in);

            num = kybd.nextInt();
            for (int i = 0; i < num; i++) {
                a[i] = kybd.nextDouble();
                b[i] = kybd.nextDouble();
                if (a[i] > b[i])
                    large[i] = a[i];
                else
                    large[i] = b[i];
            }
            for (int i = 0; i < num; i++)
                System.out.println("large[" + i + "] = " + large[i]);

            kybd.close();
        }
    }
```

Here are the input data values:

```
6
-4.2  1.56    0  8     1.0  6.75    20.3  -1    -54.2  -33.7    -41.3  -41.3
```

```
(c)public class prob7_4c {
      public static void main(String[] args)
      {
          int[] f = new int[21];

          for (int x = 8; x <= 14; x++)
              f[x] = 3 * x - 5;
          System.out.println("for the function f(x) = 3x - 5");
          for (int x = 8; x <= 14; x++)
              System.out.println("f(" + x + ")= " + f[x]);
      }
   }


(d)import java.util.Scanner;
   public class prob7_4d {
      public static void main(String[] args)
      {
          double[] sales = new double[4];
          double[] tax = new double[4];
          Scanner kybd = new Scanner(System.in);

          for (int season = 0; season < 4; season++)
              sales[season] = nextDouble();
          calc_tax(sales,tax);

          System.out.println("\tsales\ttax");
          for (int season = 0; season < 4; season++)
              System.out.println("\t" + sales[season] + '\t' + tax[season]);
      }

      public static void calc_tax(double[] sales, double[] tax)
      {
          for (int season = 0; season < 4; season++)
              tax[season] = sales[season] * 0.20;
      }
   }
```

Here are the input data values:

```
12000    24000    21000    46000
```

5. Assume that we want a set of data to contain a parameter value of 5 and then five numeric values. Which of the following show the correct form for the data? Which work but do not read all the data shown? Which run out of data?

(a) 6 12 3 4 5 19   (b) 5 5 5 5 5
(c) 5 12 3 4 5 19   (d) 5 12 3 4 5 19 87
(e) 5 3 5 4 3 t

6. What is the result of each of the following, using the declarations shown below?

```
int     first = 26, second = 4;
double ans, dval = 4.52;
```

```
(a)   ans = first / second;
(b)   ans = (double) (first / second);
(c)   ans = (double) first / second;
(d)   ans = first / (double) second;
(e)   ans = first;
(f)   first = dval;
(g)   ans = dval / second;
(h)   first = dval / second;
```

Two-Dimensional Array Exercises

7. Assume that a two-dimensional array of integers, called y, initially has the values in the Figure. Show what values are stored in the array after executing each of these program segments. Each part uses this declaration and starts from these values:

	0	1	2	3
0	5	11	6	0
1	91	3	-12	2
2	14	1	219	7

Figure: Array y for Exercise 7

```
int[][] y = new int[3][4];
int i,j;
```

```
(a)   y[1][2] = y[0][3] + y[1][1];
      y[0][3] = y[2][0] + y[2][1];
      y[1][3] = y[0][1] + y[1][3];
```

```
(b)   i = 0;
      y[i+1][0] = y[i+1][i+3];
      i = 1;
      y[0][3] = y[2][i-1]
```

```
(c)   i = 1;      j = 2;
      y[2][1] = y[2][0] + y[1][2];
      y[i][j] = i + j + y[2][3]
```

8. For each of the following program segments, show exactly what is printed. Also draw a picture showing the final values stored in the array <u>arr</u>. If a storage location does not have a value, indicate its value with ?. Use this declaration for each part:

```
int[][] arr= new int[5][6];
```

(a)   for (int i = 0; i < 5; i++)
           for (int j = 0; j < 6; j++)   {
               arr[i][j] = 10 * i + j;
               System.out.println("i = " + i + "   j = " + j
                   + " and the array is " + arr[i][j]);
           }

(b)   for (int i = 5; i < 10; i++)
           for (int j = 6; j > 2; j--)
               if (i > j)
                   arr[i-5][j-1] = i + j;
               else
                   arr[j-i+1][j-1] = 19;
       for (int i = 0; i < 5; i++)
           for (int j = 0; j < 6; j++)
               System.out.println("i = " + i + "   j = " + j
                   + " and the array is " + arr[i][j]);
```