Exercises Five (Oct. 16): Selected Exercises.

Try to solve the Following Problems & submit all your programs to email program06@yeah.net before (including) Oct. 21.

1. The teacher of kindergarten hands out chocolate bars to kids. The first kid get 12 pieces, the second get 24 pieces, the third 8, the fourth 22, the fifth 15, the sixth 4, the seventh 8,the eight 6,the ninth x pieces. For the sake of fairness, every kid give half of all he own chocolate bars to the right kid of him(For example,2 is on the right of 1).If he has odd pieces, he should give one to the teacher. Every one give his own before getting from the left one. After n loops, all kids get the same amount of chocolate bars(y pieces.)Now ask the user to enter "x" between 1 and 40.Output "n" and "y".

```
Enter x: 13
After looping 14 times, each kid get 6 chocolates.
```

2 (*Eliminate duplicates*) Write a method that returns a new array by eliminating the duplicate values in the array using the following method header:

```
public static int[] eliminateDuplicates(int[] list)
```

Write a test program that reads in ten integers, invokes the method, and displays the result. Here is the sample run of the program:

```
Enter ten numbers: 1 2 3 2 1 6 3 4 5 2 Enter
The distinct numbers are: 1 2 3 6 4 5
```

3 (*Algebra: solve linear equations*) Write a method that solves the following 2×2 system of linear equations:

$$\begin{aligned} a_{00}x + a_{01}y &= b_0 \\ a_{10}x + a_{11}y &= b_1 \end{aligned} \qquad x = \frac{b_0a_{11} - b_1a_{01}}{a_{00}a_{11} - a_{01}a_{10}} \qquad y = \frac{b_1a_{00} - b_0a_{10}}{a_{00}a_{11} - a_{01}a_{10}}$$

The method header is

```
public static double[] linearEquation(double[][] a, double[] b)
```

The method returns `null` if $a_{00}a_{11} - a_{01}a_{10}$ is `0`. Write a test program that prompts the user to enter a_{00}, a_{01}, a_{10}, a_{11}, b_0, and b_1, and displays the result. If $a_{00}a_{11} - a_{01}a_{10}$ is `0`, report that "The equation has no solution."

```
Enter a00, a01, b0, a10, a11, b1: 9.0 4.0 3.0 -5.0 -6.0 -21.0
x is -2.0 and y is 3.0
```

```
Enter a00, a01, b0, a10, a11, b1: 1.0 2.0 2.0 4.0 4.0 5.0
The equation has no solution
```

***4** (*Largest block*) Given a square matrix with the elements 0 or 1, write a program to find a maximum square submatrix whose elements are all 1s. Your program should prompt the user to enter the number of rows in the matrix. The program then displays the location of the first element in the maximum square submatrix and the number of the rows in the submatrix. Here is a sample run:

```
Enter the number of rows in the matrix: 5 Enter
Enter the matrix row by row:
1 0 1 0 1 Enter
1 1 1 0 1 Enter
1 0 1 1 1 Enter
1 0 1 1 1 Enter
1 0 1 1 1 Enter

The maximum square submatrix is at (2, 2) with size 3
```