

1.

a)

	0	1	2	3	4
0	■	■	■	■	■
1	■	■	■	■	■
2	■	■	■	■	■
3	■	■	■	■	■
4	■	■	■	■	■

b)

	0	1	2	3	4
0	■				■
1		■		■	
2			■		
3		■		■	
4	■				■

c)

	0	1	2	3	4
0	■		■		■
1		■		■	
2	■		■		■
3		■		■	
4	■		■		■

d)

	0	1	2	3	4
0	■	■	■	■	■
1	■				■
2	■				■
3	■				■
4	■	■	■	■	■

2.

```

public class Midterm {

    public static void main(String args[]) {
        random999();
    }

    static void random999() {
        final int N = 1000;
        int x[] = new int[N];
        for (int i = 0; i < N; i++) {
            x[i] = i;
        }
        for (int i = 0; i < N; i++) {
            int j = (int) (Math.random() * N);
            int temp = x[i];
            x[i] = x[j];
            x[j] = temp;
        }
        for (int i = 0; i < N; i++) {
            System.out.println(
                String.format("%3d", x[i]));
        }
    }
}

```

3.

```

public class Midterm {

    public static void main(String args[]) {
        collatz(6);
    }

    static void collatz(int n) {
        System.out.println(n);
        while (n != 1) {
            if (n % 2 == 0) {
                n = n / 2;
            } else {
                n = n * 3 + 1;
            }
            System.out.println(n);
        }
    }
}

```

4.

```

import java.util.Scanner;
public class Midterm {

    public static void main(String args[]) {
        double a, b, c, d;
        System.out.print("Enter a, b, and c: ");
        Scanner s = new Scanner(System.in);
        a = s.nextDouble();
        b = s.nextDouble();
        c = s.nextDouble();
        d = b * b - 4 * a * c;
        if (d > 0) {
            System.out.print(
                String.format("x1 = %f, x2 = %f",
                    (-b + Math.sqrt(d)) / (2 * a),
                    (-b - Math.sqrt(d)) / (2 * a)));
        } else if (d < 0) {
            System.out.print(
                String.format("x1,2 = %f ± %fi",
                    -b / (2 * a),
                    Math.sqrt(-d) / (2 * a)));
        } else {
            System.out.print(
                String.format("x1,2 = %f",
                    -b / (2 * a)));
        }
    }
}

```

5.

```

import java.util.Scanner;
public class Midterm {

    public static void main(String args[]) {
        final int N = 1000;
        final int M = 100;
        int i, x[] = new int[N], h[] = new int[M];
        for (i = 0; i < M; i++) {
            h[i] = 0;
        }
        for (i = 0; i < N; i++) {
            do {
                Scanner s = new Scanner(System.in);
                x[i] = s.nextInt();
            } while (x[i] < 0 || x[i] >= M);
            h[x[i]]++;
        }
        for (i = 0; i < M; i++) {
            System.out.println(
                String.format("%4d: %d", i, h[i]));
        }
    }
}

```

6.

```

public class Midterm {

    public static void main(String args[]) {
        System.out.println(gpa('A'));
    }

    static int gpa(char g) {
        switch (g) {
            case 'A': case 'a': return 4;
            case 'B': case 'b': return 3;
            case 'C': case 'c': return 2;
            case 'D': case 'd': return 1;
            case 'F': case 'f': return 0;
            default: return -1;
        }
    }
}

```