第三章

3.4

```
public class Code3_4 {
    public static void main(String arg[]) {
        String[] s = new String[] { " ", "Januray", "February", "March",
"April", "May", "June", "July", "August","September", "October", "November",
"December" };
        int num = (int) (Math.random() * 12) + 1;
        System.out.println(s[num]);
    }
}
```

3.9

```
import java.util.Scanner;

public class Code3_9 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter the first 9 digits of an ISBN as integer: ");
        String id = input.next();
        int sum = 0;
        for (int i = 1; i < 10; i++) {
            sum += (id.charAt(i - 1) - '0') * i;
        }
        sum = sum % 11;
        char ans = (char) (sum + '0');
        if (sum == 10)
            ans = 'X';
        System.out.println("The ISBN-10 number is " + id + ans);
        input.close();
    }
}
```

3.15

```
import java.util.Scanner;

public class Code3_15 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter a three-digit integer: ");
        int num0 = (int) (Math.random() * 900 + 100);
        int[] c = new int[10];
        int[] a = new int[3];
        a[0] = num0 / 100;
        a[1] = num0 / 10 % 10;
        a[2] = num0 % 10;
        for (int i = 0; i < 3; i++) {
```

```
            ++c[a[i]];
        }
        int num = input.nextInt();
        int[] b = new int[3];
        b[0] = num / 100;
        b[1] = num / 10 % 10;
        b[2] = num % 10;
        int count = 0;
        for (int i = 0; i < 3; i++) {
            if (c[b[i]] != 0) {
                --c[b[i]];
                count++;
            }
        }
        if (a[0] == b[0] && a[1] == b[1] && a[2] == b[2]) {
            System.out.println("You will win: 10000");
        } else if (count == 3) {
            System.out.println("You will win: 3000");
        } else if (count >= 1) {
            System.out.println("You will win: 1000");
        } else {
            System.out.println("No price");
        }
        input.close();
    }
}
```

3.19

```
import java.util.Scanner;

public class Code3_19 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter the three sides of the triangle: ");
        double a = input.nextDouble();
        double b = input.nextDouble();
        double c = input.nextDouble();
        if (a > 0 && b > 0 && c > 0 && a + b > c && b + c > a && a + c > b) {
            double ans = a + b + c;
            System.out.println("Perimeter of triangle is: " + ans);
        } else {
            System.out.println("Invalid triangle");
        }
        input.close();
    }
}
```

3.21

```java
import java.util.Scanner;

public class Code3_21 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        String[] ans = { "Saturday", "Sunday", "Monday", "Tuesday", "Wednesday",
"Thursday", "Friday" };
        System.out.print("Enter year: (e.g., 2021): ");
        int year = input.nextInt();
        System.out.print("Enter month: 1-12: ");
        int month = input.nextInt();
        System.out.print("Enter the day of the month: 1-31: ");
        int day = input.nextInt();
        if (month == 1 || month == 2) {
            month = month + 12;
            --year;
        }
        int j = year / 100;
        int k = year % 100;
        int h = (day + 26 * (month + 1) / 10 + k + k / 4 + j / 4 + 5 * j) % 7;
        System.out.println("Day of the week is " + ans[h]);
        input.close();
    }
}
```

3.22

```java
import java.util.Scanner;

public class Code3_22 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter a point with two coordinates: ");
        double x = input.nextDouble();
        double y = input.nextDouble();
        double dis = Math.sqrt(x * x + y * y);
        if (dis <= 10)
            System.out.println("Point (" + x + ", " + y + ") is in the circle");
        else
            System.out.println("Point (" + x + ", " + y + ") is not in the
circle");
        input.close();
    }
}
```

3.23

```
import java.util.Scanner;

public class Code3_23 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter a point with two coordinates: ");
        double x = input.nextDouble();
        double y = input.nextDouble();
        if (Math.abs(x) <= 5 && Math.abs(y) <= 2.5)
            System.out.println("Point (" + x + ", " + y + ") is in the
rectangle");
        else
            System.out.println("Point (" + x + ", " + y + ") is not in the
rectangle");
        input.close();
    }
}
```

3.24

```
public class Code3_24 {
    public static void main(String[] args) {
        String[] color = { "Clubs", "Diamonds", "Hearts", "Spades" };
        String[] num = { "", "Ace", "1", "2", "3", "4", "5", "6", "7", "8", "9",
"10", "Jack", "Queen", "King" };
        int c = (int) (Math.random() * 4);
        int n = (int) (Math.random() * 14 + 1);
        System.out.println("The card you picked is " + num[n] + " of " +
color[c]);
    }
}
```

3.27

```
import java.util.Scanner;

public class Code3_27 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter a point's x- and y-coordinates: ");
        double x = input.nextDouble();
        double y = input.nextDouble();
        if (x >= 0 && y >= 0 && y <= -0.5 * x + 100)
            System.out.println("The point is in the triangle");
        else
            System.out.println("The point is not in the triangle");
        input.close();
    }
}
```

3.28

```
import java.util.Scanner;

public class Code3_28 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter r1's center x-, y-coordinates, width, and
height: ");
        double x1 = input.nextDouble();
        double y1 = input.nextDouble();
        double width1 = input.nextDouble();
        double height1 = input.nextDouble();
        System.out.print("Enter r2's center x-, y-coordinates, width, and
height: ");
        double x2 = input.nextDouble();
        double y2 = input.nextDouble();
        double width2 = input.nextDouble();
        double height2 = input.nextDouble();

        double left1 = x1 - width1 / 2.0;
        double right1 = x1 + width1 / 2.0;
        double up1 = y1 + height1 / 2.0;
        double down1 = y1 - height1 / 2.0;
        double left2 = x2 - width2 / 2.0;
        double right2 = x2 + width2 / 2.0;
        double up2 = y2 + height2 / 2.0;
        double down2 = y2 - height2 / 2.0;

        if (left1 <= left2 && right1 >= right2 && up1 >= up2 && down1 <= down2)
            System.out.println("r2 is inside r1");
        else if (up1 < down2 || down1 > up2 || right1 < left2 || left1 > right2)
            System.out.println("r2 does not overlap r1");
        else
            System.out.println("r2 overlap r1");
        input.close();
    }

}
```

3.29

```
import java.util.Scanner;

public class Code3_29 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter circle1's center x-, y-coordinates, and radius:
");
        double x1 = input.nextDouble();
        double y1 = input.nextDouble();
        double r1 = input.nextDouble();
        System.out.print("Enter circle2's center x-, y-coordinates, and radius:
");
        double x2 = input.nextDouble();
```

```
        double y2 = input.nextDouble();
        double r2 = input.nextDouble();

        double dis = Math.sqrt((x1 - x2) * (x1 - x2) + (y1 - y2) * (y1 - y2));
        if (dis <= Math.abs(r1 - r2))
            System.out.println("circle2 is inside circle1");
        else if (dis <= r1 + r2)
            System.out.println("circle2 overlaps circle1");
        else
            System.out.println("circle2 does not overlap circle1");
        input.close();
    }
}
```

第五章

5.7

```
public class Code5_7 {
    public static void main(String[] args) {
        double sum = 10000;
        for (int i = 0; i < 10; i++) {
            sum = sum * 1.05;
        }
        double ans = 0;
        for (int i = 0; i < 4; i++) {
            ans += sum;
            sum = sum * 1.05;
        }
        System.out.println(ans);
    }
}
```

5.17

```
import java.util.Scanner;

public class Code5_17 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter the number of lines: ");
        int n = input.nextInt();
        for (int i = 1; i <= n; i++) {
            for (int j = 1; j <= n - i; j++) {
                System.out.print("   ");
            }
            for (int j = 1; j < 2 * i - 1; j++) {
                int num = Math.abs(i - j) + 1;
                System.out.format("%3d", num);
            }
            int num = i;
            System.out.format("%3d\n", num);
        }
```

```
        input.close();
    }
}
```

5.19

```
public class Code5_19 {
    public static void main(String[] args) {
        int n = 8;
        for (int i = 1; i <= n; i++) {
            for (int j = 1; j <= n - i; j++) {
                System.out.print("    ");
            }
            for (int j = 1; j < 2 * i - 1; j++) {
                int mi = j - 1;
                if (j > i)
                    mi = mi - 2 * (j - i);
                int num = (int) Math.pow(2, mi);
                System.out.format("%4d", num);
            }
            int num = 1;
            System.out.format("%4d\n", num);
        }
    }
}
```

5.21

```
import java.util.Scanner;

public class Code5_21 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Loan Amount: ");
        double amount = input.nextDouble();
        System.out.print("Number of Years: ");
        int year = input.nextInt();
        System.out.println("Interest Rate    Monthly Payment    Total Payment");
        for (double i = 5; i <= 8; i += 0.125) {
            double monthlyInterestRate = i / 1200;
            double monthlyPayment = amount * monthlyInterestRate
                    / (1 - 1 / Math.pow(1 + monthlyInterestRate, year * 12));
            double totalPayment = monthlyPayment * year * 12;
            System.out.format("%.3f%%           %.2f             %.2f\n", i,
monthlyPayment, totalPayment);
        }
        input.close();
    }
}
```

5.22

```
import java.util.Scanner;

public class Code5_22 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Loan Amount: ");
        double amount = input.nextDouble();
        System.out.print("Number of Years: ");
        int numberOfYears = input.nextInt();
        System.out.print("Annual Interest Rate: ");
        double rate = input.nextDouble();
        double monthlyInterestRate = rate / 1200;
        double monthlyPayment = amount * monthlyInterestRate
                / (1 - 1 / Math.pow(1 + monthlyInterestRate, numberOfYears *
12));
        double balance = amount;
        double totalPayment = monthlyPayment * numberOfYears * 12;

        System.out.println("Monthly Payment: " + monthlyPayment);
        System.out.println("Total Payment: " + totalPayment + "\n");

        System.out.println("Payment#" + "\t" + "Interest" + "\t" + "Principal" +
"\t" + "Balance");
        for (int i = 1; i <= numberOfYears * 12; i++) {
            double interest = monthlyInterestRate * balance;
            double principal = monthlyPayment - interest;
            balance = balance - principal;
            System.out.println(i + "\t\t" + String.format("%.2f", interest) +
"\t\t" + String.format("%.2f", principal)
                    + "\t\t" + String.format("%.2f", balance));
        }
        input.close();
    }
}
```

5.25

```
public class Code5_25 {
    public static void main(String[] args) {
        for (int i = 10000; i <= 100000; i += 10000) {
            System.out.println("i = " + i + ", PI = " + cal(i));
        }
    }

    public static double cal(int n) {
        double ans = 0;
        int sign = 1;
        for (int i = 1; i <= n; i++) {
            ans = ans + sign * 1.0 / (2 * i - 1);
            sign = -sign;
        }
        return 4 * ans;
```

```
    }
}
```

5.26

```
public class Code5_26 {
    public static void main(String[] args) {
        for (int i = 10000; i <= 100000; i += 10000) {
            System.out.println("i = " + i + ", e = " + cal(i));
        }
    }

    public static double cal(int n) {
        double ans = 1;
        double num = 1;
        for (int i = 1; i <= n; i++) {
            num = num / i;
            ans = ans + num;
        }
        return ans;
    }
}
```

5.27

```
public class Code5_27 {
    public static void main(String[] args) {
        int sum = 0;
        for (int i = 101; i <= 2100; i++) {
            if (i % 4 == 0 && i % 100 != 0 || i % 400 == 0) {
                ++sum;
                if (sum % 10 != 0)
                    System.out.print(i + " ");
                else
                    System.out.println(i);
            }
        }
        System.out.println("");
        System.out.println("sum = " + sum);
    }
}
```

5.28

```
import java.util.Scanner;

public class Code5_28 {
    public static void main(String[] args) {
        int[] a = { 0, 31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31 };
        String[] day = { "Sunday", "Monday", "Tuesday", "Wednesday", "Thursday",
"Friday", "Saturday" };
```

```
        String[] month = { "January", "February", "March", "April", "May",
"June", "July", "August", "September","October", "November", "December" };

        Scanner input = new Scanner(System.in);
        System.out.print("Year: ");
        int year = input.nextInt();
        System.out.print("The first day of the year is: ");
        int num = input.nextInt();

        if (year % 4 == 0 && year % 100 != 0 || year % 400 == 0) {
            a[2] += 1;
        }
        for (int i = 0; i < 12; i++) {
            num += a[i];
            System.out.println(month[i] + " 1, " + year + " is " + day[num %
7]);
        }
        input.close();
    }
}
```

5.29

```
import java.util.Scanner;

public class Code5_29 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Years: ");
        int year = input.nextInt();
        System.out.print("The first day of the year: ");
        int startDay = input.nextInt();

        printMonthTitle(1, year);
        int whatDay = printMonthBody(startDay, 1, year);
        for (int month = 2; month <= 12; month++) {
            printMonthTitle(month, year);
            whatDay = printMonthBody(whatDay, month, year);
        }
        input.close();
    }

    public static boolean isLeap(int year) {
        if ((year % 4 == 0 && year % 100 != 0) || (year % 400 == 0))
            return true;
        else
            return false;
    }

    public static int[] makeSureDays(int year) {
        int[] leapDays = { 31, 29, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31 };
        int[] nonLeapDays = { 31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31 };

        if (isLeap(year))
            return leapDays;
```

```
        else
            return nonLeapDays;
    }

    public static String getMonthName(int month) {
        String monthName = "";
        switch (month) {
        case 1:
            monthName = "January";
            break;
        case 2:
            monthName = "February";
            break;
        case 3:
            monthName = "March";
            break;
        case 4:
            monthName = "April";
            break;
        case 5:
            monthName = "May";
            break;
        case 6:
            monthName = "June";
            break;
        case 7:
            monthName = "July";
            break;
        case 8:
            monthName = "August";
            break;
        case 9:
            monthName = "September";
            break;
        case 10:
            monthName = "October";
            break;
        case 11:
            monthName = "November";
            break;
        case 12:
            monthName = "December";
        }

        return monthName;
    }

    public static void printMonthTitle(int month, int year) {
        String monthName = getMonthName(month);
        System.out.println("         " + monthName + " " + year);

        System.out.println("-----------------------------");

        System.out.println(" Sun Mon Tue Wed Thu Fri Sat");
    }

    public static int printMonthBody(int whatDay, int month, int year) {
        // whatDay is the first day of the month
```

```
        int track = 0;
        for (int j = 0; j < (whatDay % 7); j++) {
            System.out.print("    ");
            track++;
        }
        int[] days = makeSureDays(year);
        // days[month - 1]
        for (int i = 1; i <= days[month - 1]; i++) {
            System.out.printf("%4d", i);
            track++;
            if (track % 7 == 0) {
                System.out.printf("\n");
            }
        }
        System.out.printf("\n");
        return (track % 7);
    }
}
```

5.32

```
public class Code5_32 {
    public static void main(String[] args) {
        int num1 = (int) (Math.random() * 10);
        int num2 = (int) (Math.random() * 10);
        while (num2 == num1) {
            num2 = (int) (Math.random() * 10);
        }
        System.out.println(num1 + " " + num2);
    }
}
```

5.33

```
public class Code5_33 {
    public static void main(String[] args) {
        for (int i = 1; i < 10000; i++) {
            if (isnum(i))
                System.out.println(i);
        }
    }

    public static boolean isnum(int n) {
        int sum = 0;
        for (int i = 1; i < n; i++) {
            if (n % i == 0)
                sum += i;
        }
        return sum == n;
    }
}
```

5.36

```java
import java.util.Scanner;

public class Code5_36 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);

        System.out.print("Enter the first 9 digits of an ISBN as integer: ");
        String id = input.next();
        int sum = 0;
        for (int i = 1; i < 10; i++) {
            sum += (id.charAt(i - 1) - '0') * i;
        }
        sum = sum % 11;
        char ans = (char) (sum + '0');
        if (sum == 10)
            ans = 'X';
        System.out.println("The ISBN-10 number is " + id + ans);
        input.close();
    }
}
```

5.37

```java
import java.util.Scanner;

public class Code5_37 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Input a digit: ");
        int num = input.nextInt();
        int[] a = new int[100];
        int len = 0;
        while (num != 0) {
            a[++len] = num % 2;
            num /= 2;
        }
        for (int i = len; i >= 1; i--) {
            System.out.print(a[i]);
        }
        input.close();
    }
}
```

5.38

```java
import java.util.Scanner;

public class Code5_38 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter a digit: ");
        int num = input.nextInt();
```

```
        int[] a = new int[1000];
        int len = 0;
        while (num != 0) {
            a[++len] = num % 8;
            num /= 8;
        }
        for (int i = len; i > 0; i--) {
            System.out.print(a[i]);
        }
        input.close();
    }
}
```

5.45

```
import java.util.Scanner;

public class Code5_45 {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter 10 numbers: ");
        double[] num = new double[10];
        for (int i = 0; i < 10; i++) {
            num[i] = input.nextDouble();
        }
        System.out.print("The mean is ");
        double sum = 0;
        for (int i = 0; i < 10; i++) {
            sum += num[i];
        }
        System.out.format("%.2f\n", sum / 10);

        System.out.print("The standard deviation is ");
        double sum2 = 0;
        for (int i = 0; i < 10; i++) {
            sum2 += num[i] * num[i];
        }
        System.out.format("%.5f\n", Math.sqrt((sum2 - sum * sum / 10) / (9)));

        input.close();
    }
}
```