## 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

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

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

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

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

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();  
 }  
}