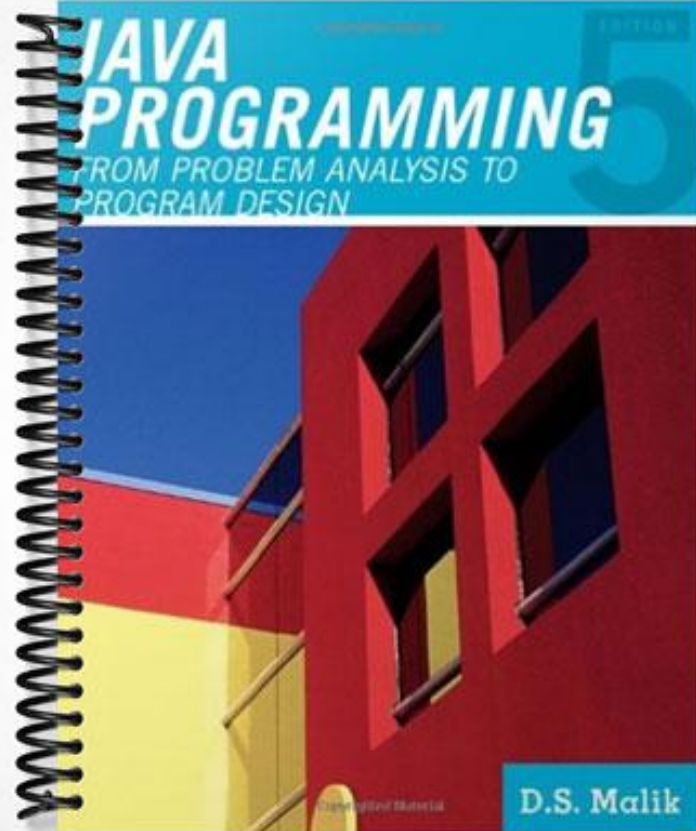


**SOLUTIONS MANUAL**



# Chapter 1

1. a. False; b. False; c. True; d. False; e. False; f. True; g. True; h. False; i. False; j. True; k. False; l. True.
2. Keyboard and mouse.
3. Monitor and printer.
4. Because programs and data must be stored in main memory before processing and because everything in main memory is lost when the computer is turned off, information stored in main memory must be transferred to some other device for permanent storage. Secondary storage permanently stores programs and data.
5. An operating system monitors the overall activity of the computer and provides services. Some of these services include memory management, input/output activities, and storage management.
6. The two types of programs are system programs and application programs.
7. In machine language the programs are written using the binary codes while in high-level language the program are closer to the natural language. For execution, a high-level language program is translated into the machine language while a machine language need not be translated into any other language.
8. A program written in a high-level language is called a source program.
9. Syntax errors.
10. Every computer directly understands its machine language. Therefore, for the computer to execute a program written in a high level language, the high level language program must be translated into the computer's machine language.
11. Instructions in a high level language are closer to the natural language, such as English, and therefore, are easier to understand and learn than the machine language.
12. A well-analyzed problem leads to a well designed algorithm. Moreover, a program that is well-analyzed is easier to modify and spot and fix errors.
13. To find the weighted average of the four test scores, first you need to know each test score and its weight. Next, you multiply each test score with its weight, and then add these numbers to get the average. Therefore,
  1. `Get testScore1, weightTestScore1`
  2. `Get testScore2, weightTestScore2`
  3. `Get testScore3, weightTestScore3`
  4. `Get testScore4, weightTestScore4`
  5. `weightedAverage = testScore1 * weightTestScore1 +  
testScore2 * weightTestScore2 +  
testScore3 * weightTestScore3 +  
testScore4 * weightTestScore4;`
14. To find the price per square inch, first we need to find the area of the pizza. Then we divide the price of the pizza by the area of the pizza. Let `radius` denote the radius and `area` denote the area of the

circle, and `price` denote the price of pizza. Also, let `pricePerSquareInch` denote the price per square inch.

a. `Get radius`

b. `area = π * radius * radius`

c. `Get price`

d. `pricePerSquareInch = price / area`

15. To calculate the selling price of an item, we need to know the original price (the price the store pays to buy) of the item. We can then use the following formula to find the selling price:

```
sellingPrice = (originalPrice + originalPrice * 0.80) * 0.90
```

The algorithm is as follows:

a. `Get originalPrice`

b. Calculate the `sellingPrice` using the formula:

```
sellingPrice = (originalPrice + originalPrice * 0.80) * 0.90
```

The information needed to calculate the selling price is the original price and the marked-up percentage.

16. To calculate the area of the triangle using the given formula, we need to know the lengths of the sides, `a`, `b`, and `c`, of the triangle. Next we calculate `s` using the formula

```
s = (1/2) (a + b + c)
```

next calculate the area using the formula:

```
area = sqrt(s(s-a)(s-b)(s-c))
```

where `sqrt` denotes the square root.

The algorithm is therefore:

a. `Get a, b, c`

b. `s = (1/2) (a + b + c)`

c. `area = sqrt(s(s-a)(s-b)(s-c))`

The information needed to calculate the area of the triangle is the lengths of the sides of the triangle.

17. Suppose that `numOfPages` denotes the number of pages to be faxed and `billingAmount` denotes the total charges for the pages faxed. To calculate the total charges, you need to know the number of pages faxed.

If `numOfPages` is less than or equal to ten, the billing amount is service charges plus (`numOfPages` × 0.20); otherwise, billing amount is service charges plus 10 × 0.20 plus (`numOfPages` - 10) × 0.10.

You can now write the algorithm as follows:

a. `Get numOfPages.`

b. Calculate billing amount using the formula:

```
if (numOfPages is less than or equal to 10)
```

```
    billingAmount = 3.00 + (numOfPages * 0.20);
```

otherwise

```
billingAmount = 3.00 + 10 * 0.20 + (numOfPages - 10) * 0.10;
```

18. Suppose `averageTestScore` denotes the average test score, `highestScore` denotes the highest test score, `testScore` denotes a test score, `sum` denotes the sum of all the test scores, and `count` denotes the number of students in class, and `studentName` denotes the name of a student.

a. First you design an algorithm to find the average test score. To find the average test score, first you need to count the number of students in the class and add the test score of each student. You then divide the sum by count to find the average test score. The algorithm to find the average test score is as follows:

i. Set `sum` and `count` to 0.

ii. Repeat the following for each student in class.

1. Get `testScore`

2. Increment `count` and update the value of `sum` by adding the current test score to `sum`.

iii. Use the following formula to find the average test score.

```
if (count is 0)
```

```
    averageTestScore = 0;
```

```
otherwise
```

```
    averageTestScore = sum / count;
```

b. The following algorithm determines and prints the names of all the students whose test score is below the average test score.

Repeat the following for each student in class:

i. Get `studentName` and `testScore`

ii.

```
    if (testScore is less than averageTestScore)
```

```
        print studentName
```

c. The following algorithm determines and highest test score

i. Get first student's test score and call it `highestTestScore`.

ii. Repeat the following for each of the remaining students in class

1. Get `testScore`

2.

```
    if (testScore is greater than highestTestScore)
```

```
        highestTestScore = testScore;
```

d. To print the names of all the students whose test score is the same as the highest test score, compare the test score of each student with the highest test score and if they are equal print the name. The following algorithm accomplishes this

Repeat the following for each student in class:

i. Get `studentName` and `testScore`

ii.

```
    if (testScore is equal to highestTestScore)
```

```
print studentName
```

You can use the solutions of the subproblems obtained in parts a to d to design the main algorithm as follows:

1. Use the algorithm in part a to find the average test score.
2. Use the algorithm in part b to print the names of all the students whose score is below the average test score.
3. Use the algorithm in part c to find the highest test score.
4. Use the algorithm in part d to print the names of all the students whose test score is the same as the highest test score

## Chapter 2

1. a. False; b. False; c. False; d. False; e. True; f. True; g. True; h. False; i. True; j. False;
2. a, c, d, e, j
3. a
4. A keyword is a reserved word and is defined by the system. A keyword cannot be redefined in a program. A user-defined identifier can be redefined.
5. The identifiers `firstName` and `FirstName` are not the same. Java is case sensitive. The first character of `firstName` is lowercase `f` while the first character of `FirstName` is uppercase `F`. So these identifiers are different.
6.
  - a. 8
  - b. 14
  - c. 4
  - d. -2
  - e. 4.5
  - f. 25.5
  - g. 15
  - h. 16.2
7. a. 3; b. 0.5; c. 4.5; d. 38.5; e. 1; f. 2; g. 2; h. 420.0;
8. a, b, c, e, i, j, and k are valid;  
d, f, and g are invalid because the left side of an assignment must be a variable not an expression;  
h. The expression `num1 % 2.0` evaluates to a decimal number, while `num2` is an `int` variable. A decimal value cannot be stored in an `int` variable.
9. 7
10. Only the variable declarations in Lines 3 and 4 are correct
11. a and c are valid
12.
  - a. `int x, y;`
  - b. `x = 10; ch = 'B';`
  - c. `x = x + 5;`
  - d. `double payRate = 12.50;`
  - e. `tempNum = firstNum;`
  - f. `int temp = x;`  
`x = y;`  
`y = temp;`
  - g. `System.out.println(x + " " + y + " " + (x + 12 / y - 18));`
  - h. `char grade = 'A';`
  - i. `int num1, num2, num3, num4;`
  - j. `x = (int)(z + 0.5);`
13.
  - a.  $32 * a + b$
  - b. `'8'`
  - c. `"Julie Nelson"`
  - d.  $(b * b - 4 * a * c) / (2 * a)$

e.  $(a + b) / c * (e * f) - g * h$

f.  $(-b + (b * b - 4 * a * c)) / (2 * a)$

14.  $x = 5$

$y = 2$

$z = 3$

$w = 9$

15.  $x = 20$

$y = 15$

$z = 6$

$w = 11.5$

$t = 4.5$

16. a. 92. (Note that  $x + ' '$  +  $y$  is evaluate as  $(x + ' ') + y = (25 + 32) + 35 = 57 + 35 = 92$ . Moreover, `char` data type is a subcategory of integral data type and the Unicode value of ' ' is 32.)

b. 25 35

17. a.  $x = 2, y = 5, z = 6$

b.  $x + y = 7$

c. Sum of 2 and 6 is 8

d.  $z / x = 3$

e. 2 times 2 = 4

18. a. 0.5

b. 24.5

c. 37.6

d. 8.3

e. 10

f. 38.75

19. a. `System.out.println();` or `System.out.print("\n");` or `System.out.print('\n');`

b. `System.out.println("\t");`

c. `System.out.println("\");`

20. a and c are correct

21. a. `firstName`

b. `discountedPrice`

c. `numOfJuiceBottles`

d. `milesTravelled`

e. `highestTestScore`

22. a. `int num1;`

`int num2;`

b. `System.out.println("Enter two numbers separated by spaces.");`

c. (Assume that `console` is a `Scanner` object initialized to the standard input device.)

`num1 = console.nextInt();`

```
num2 = console.nextInt();  
d. System.out.println("num1 = " + num1 + "num2 = " + num2  
    + "2 * num1 - num2 = " + (2 * num1 - num2));
```

23. A correct answer is:

```
public class Exercise23  
{  
    static final int SECRET_NUM = 11213;  
    static final double PAY_RATE = 18.35;  
  
    public static void main(String[] arg)  
    {  
        int one, two, three;  
        double first, second;  
  
        double paycheck, hoursWorked;  
  
        one = 18;  
        two = 11;  
        three = 3;  
  
        first = 25;  
        second = first * three;  
  
        second = 2 * SECRET_NUM;  
  
        System.out.println(first + " " + second + " " + SECRET_NUM);  
  
        hoursWorked = 35;  
  
        paycheck = hoursWorked * PAY_RATE;  
  
        System.out.println("Wages = " + paycheck);  
    }  
}
```

24. A correct answer is.

```
import java.util.*;  
  
public class Exercise24  
{  
    static Scanner console = new Scanner(System.in);  
  
    public static void main(String[] args)  
    {  
        int temperature;  
        String first, last;  
  
        System.out.print("Enter first name: ");  
        first = console.next();  
        System.out.println();  
  
        System.out.print("Enter last name: ");  
        last = console.next();  
        System.out.println();  
    }  
}
```



```

        System.out.print("Enter today's temperature: ");
        temperature = console.nextInt();
        System.out.println();

        System.out.println(first + " " + last
            + " today's temperature is: "
            + temperature);
    }
}

```

25. A correct answer is:

```

public class Exercise25
{
    static final char STAR = '*';
    static final int PRIME = 71;

    public static void main(String[] arg)
    {
        int count = 1;
        int sum = count + PRIME;

        double x = 25.67;
        int newNum = count * PRIME + 2;

        sum = sum + count;
        x = x + sum * count;
        System.out.println(" count = " + count + ", sum = "
            + sum + ", PRIME = " + PRIME);
    }
}

```

26. A variable must be declared before it can be used.

27. The **class** String is contained in the package java.lang. You do not need to import classes from the package java.lang. The system automatically does it for you.

28. a. x \*= 2;  
 b. x += y-2;  
 c. sum += num;  
 d. z \*= x + 2;  
 e. y /= x + 5;

29. a. x = x + 5 - z;  
 b. y = y \* (2 \* x + 5 - z);  
 c. w = w + 2 \* z + 4;  
 d. x = x - (z + y - t);  
 e. sum = sum + num;  
 f. x = x / (y - 2);

30.

	a	b	c
a = (b++) + 3;	9	7	UND
c = 2 * a + (++b);	9	8	26
b = 2 * (++c) - (a++);	10	45	27

31.

	a	b	c	sum
sum = a + b + (int)c;	3	5	14.1	22
c /= a;	3	5	4.7	22
b += (int)c - a;	3	6	4.7	22
a *= 2 * b + (int)c;	48	6	4.7	22

32. (NOTE: The user input us shaded.)

```
a = 25
Enter the first integers: 20

Enter the second integers: 15

The numbers you entered are 20 and 15
z = 45.5
Your grade is A
The value of a = 65
```

33. (NOTE: The user input is shaded.)

```
Enter last name: Miller

Enter a two digit number: 34

Enter a positive integer less than 1000: 340

Name: Miller
Id: 3417
Mystery number: 3689
```

34.

```
import java.util.*;

public class Exercise34
{
    static Scanner console = new Scanner(System.in);

    static final double X = 13.45;
    static final int Y = 34;
    static final char BLANK = ' ';

    public static void main(String[] arg)
    {
        String firstName;
        String lastName;
        int num;
        double salary;

        System.out.print("Enter first name: ");
        firstName = console.next();
        System.out.println();

        System.out.print("Enter last name: ");
        lastName = console.next();
        System.out.println();

        System.out.print("Enter a positive integer less "
            + "than 70: ");
        num = console.nextInt();
    }
}
```

```
        System.out.println();

        salary = num * X;

        System.out.println("Name: " + firstName + BLANK
                            + lastName);
        System.out.println("Wages: $" + salary);
        System.out.println("X = " + X);
        System.out.println("X + Y = " + (X + Y));
    }
}
```

35. The program requires three inputs. One possible form of input is:

```
number
string
number
```

Another possible form of input is:

```
number string
number
```

