Zhejiang Normal University, China

Object-Oriented Programming Fundamentals OPPF

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ASSIGNMENT NO:
02

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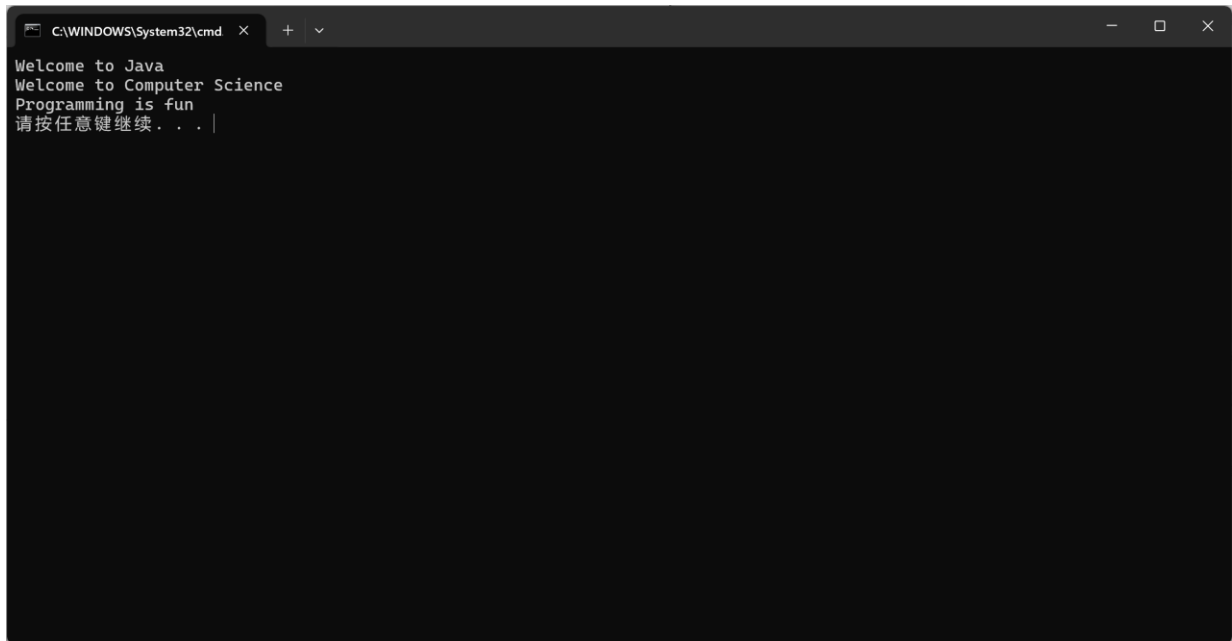Date:
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Question 1.

(*Display three messages*) Write a program that displays **Welcome to Java**,

Welcome to Computer Science, and **Programming is fun**.

Answer

```java
public class zuoye {

    public static void main(String[] args) {

        System.out.println("Welcome to Java");

        System.out.println("Welcome to Computer Science");

        System.out.println("Programming is fun");}

}
```


Question 2.

(*Display five messages*) Write a program that displays **Welcome to Java** five
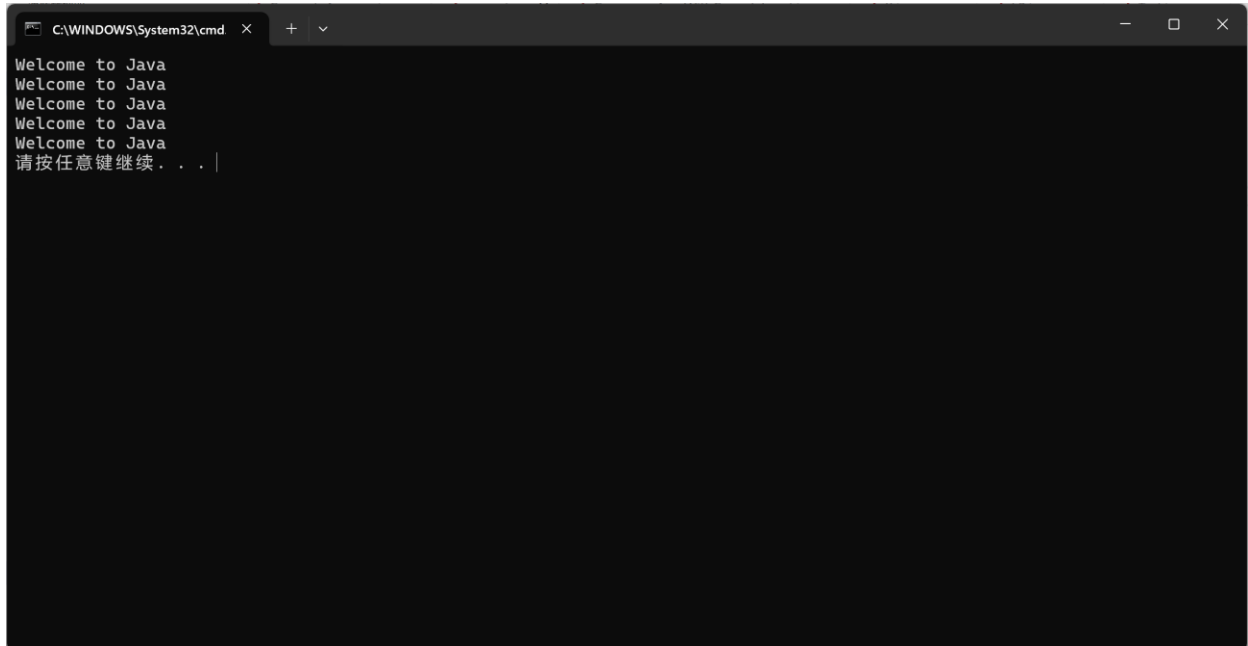
times.

Answer

```java
public class zuoye {

    public static void main(String[] args) {

        for (int i = 0; i < 5; i++) {

            System.out.println("Welcome to Java");
```

```
          }

      }

}
```

Question 3.

(*Display a pattern*) Write a program that displays the following pattern:

```
    J       A       V       V       A
    J      A A       V     V       A A
J   J    AAAAA        V V        AAAAA
  J J    A       A      V      A       A
```

Answer

public class j {

   public static void main(String[] args) {

      System.out.println("   J   A V   V A");

      System.out.println("   J   A A V V A A");

      System.out.println("J   J AAAAA V V AAAAA");

      System.out.println(" J J A   A V A   A");

   }

}

```
      J     A   V     V   A
      J    A A   V   V   A A
  J   J   AAAAA   V V   AAAAA
  J J A      A   V  A       A
请按任意键继续. . .
```

Question 4.

(*Print a table*) Write a program that displays the following table:

```
     a      a^2      a^3
     1       1        1
     2       4        8
     3       9       27
     4      16       64
```

Answer

public class j {

  public static void main(String[] args) {

    System.out.printf("%5s%5s%5s\n", "a", "a^2", "a^3");

    System.out.printf("%5d%5d%5d\n", 1, 1 * 1, 1 * 1 * 1);

    System.out.printf("%5d%5d%5d\n", 2, 2 * 2, 2 * 2 * 2);

    System.out.printf("%5d%5d%5d\n", 3, 3 * 3, 3 * 3 * 3);

    System.out.printf("%5d%5d%5d\n", 4, 4 * 4, 4 * 4 * 4);

  }

}

```
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 a    a^2    a^3
 1    1      1
 2    4      8
 3    9      27
 4    16     64
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```
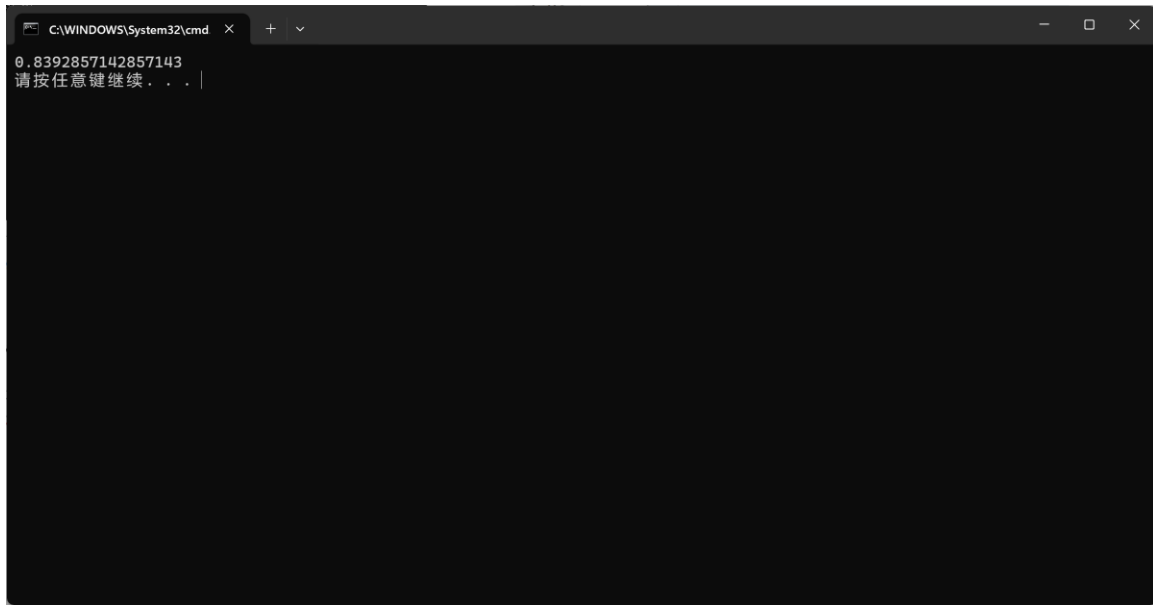
Question 5.

(*Compute expressions*) Write a program that displays the result of

$$\frac{9.5 \times 4.5 - 2.5 \times 3}{45.5 - 3.5}.$$

Answer

public class j {

  public static void main(String[] args) {

    System.out.println((9.5*4.5-2.5*3)/(45.5-3.5));

  }

}

Question 6.

(*Summation of a series*) Write a program that displays the result of

$$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9.$$

Answer

```
public class j {

   public static void main(String[] args) {

      int sum = 0;

      for (int i = 1; i <= 9; i++) {

         sum += i;

      }

      System.out.println("The result of the series is: " + sum);

   }

}
```

```
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The result of the series is: 45
请按任意键继续. . .
```

Question 7.

1.7 (*Approximate* π) π can be computed using the following formula:

$$\pi = 4 \times \left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \dots \right)$$

Write a program that displays the result of $4 \times \left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} \right)$

and $4 \times \left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \frac{1}{13} \right)$. Use **1.0** instead of **1** in your program.

Answer

public class ApproximatePi {

  public static void main(String[] args) {

    double pi1 = 4.0 * (1.0 - 1.0 / 3.0 + 1.0 / 5.0 - 1.0 / 7.0 + 1.0 / 9.0 - 1.0 / 11.0);

    double pi2 = 4.0 * (1.0 - 1.0 / 3.0 + 1.0 / 5.0 - 1.0 / 7.0 + 1.0 / 9.0 - 1.0 / 11.0 + 1.0 / 13.0);

    System.out.println("Result of the first approximation: " + pi1);

    System.out.println("Result of the second approximation: " + pi2);

  }

}

Question 8.

(*Area and perimeter of a circle*) Write a program that displays the area and perimeter of a circle that has a radius of **5.5** using the following formulas:

$$perimeter = 2 \times radius \times \pi$$

$$area = radius \times radius \times \pi$$

Answer

```
public class j {
    public static void main(String[] args) {
        double radius = 5.5;
        double pi = Math.PI;

        double perimeter = 2 * radius * pi;
        double area = radius * radius * pi;

        System.out.println("Perimeter of the circle: " + perimeter);
        System.out.println("Area of the circle: " + area);
    }
}
```

```
Perimeter of the circle: 34.55751918948772
Area of the circle: 95.03317777109125
请按任意键继续. . .
```

Question 9.

1.9 (*Area and perimeter of a rectangle*) Write a program that displays the area and perimeter of a rectangle with a width of **4.5** and a height of **7.9** using the following formula:

$$area = width \times height$$

Answer

public class j {

  public static void main(String[] args) {

    double width = 4.5;

    double height = 7.9;

    double perimeter = 2 * (width + height);

    double area =width * height;

    System.out.println("Perimeter of the rectangle: " + perimeter);

    System.out.println("Area of the rectangle: " + area);

  }

}

```
Perimeter of the rectangle: 24.8
Area of the rectangle: 35.550000000000004
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```
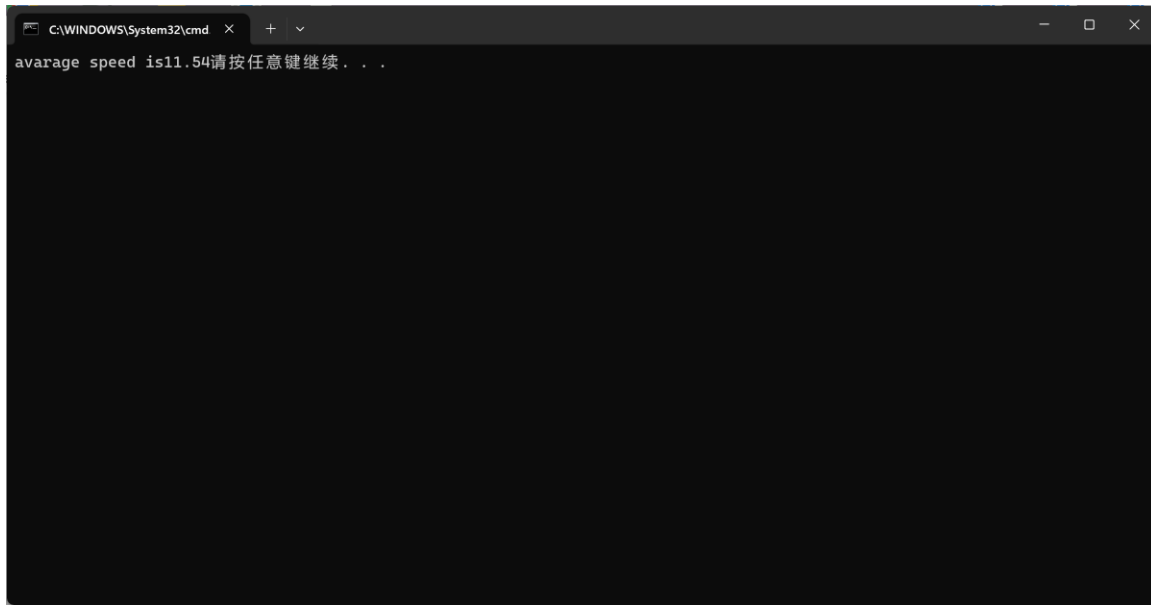
Question 10.

1.10　(*Average speed in miles*) Assume that a runner runs **14** kilometers in **45** minutes and **30** seconds. Write a program that displays the average speed in miles per hour. (Note **1** mile is equal to **1.6** kilometers.)

Answer

```
public class j {

    public static void main(String[] args) {


        double kilometers = 14;

        int timeMinutes = 45;

        int timeSeconds = 30;

        double milesPerKilometer = 1 / 1.6;

        double totalTimeHours = timeMinutes / 60.0 + timeSeconds / 3600.0;

        double averageSpeedMilesPerHour = (kilometers * milesPerKilometer) /
totalTimeHours;


        System.out.printf("avarage speed is %.2f", averageSpeedMilesPerHour);

    }
}
```

Question 11.

*1.11   (*Population projection*) The U.S. Census Bureau projects population based on the following assumptions:

- One birth every 7 seconds
- One death every 13 seconds
- One new immigrant every 45 seconds

Write a program to display the population for each of the next five years. Assume that the current population is 312,032,486, and one year has 365 days. *Hint*: In Java, if two integers perform division, the result is an integer. The fractional part is truncated. For example, **5 / 4** is **1** (not **1.25**) and **10 / 4** is **2** (not **2.5**). To get an accurate result with the fractional part, one of the values involved in the division must be a number with a decimal point. For example, **5.0 / 4** is **1.25** and **10 / 4.0** is **2.5**.
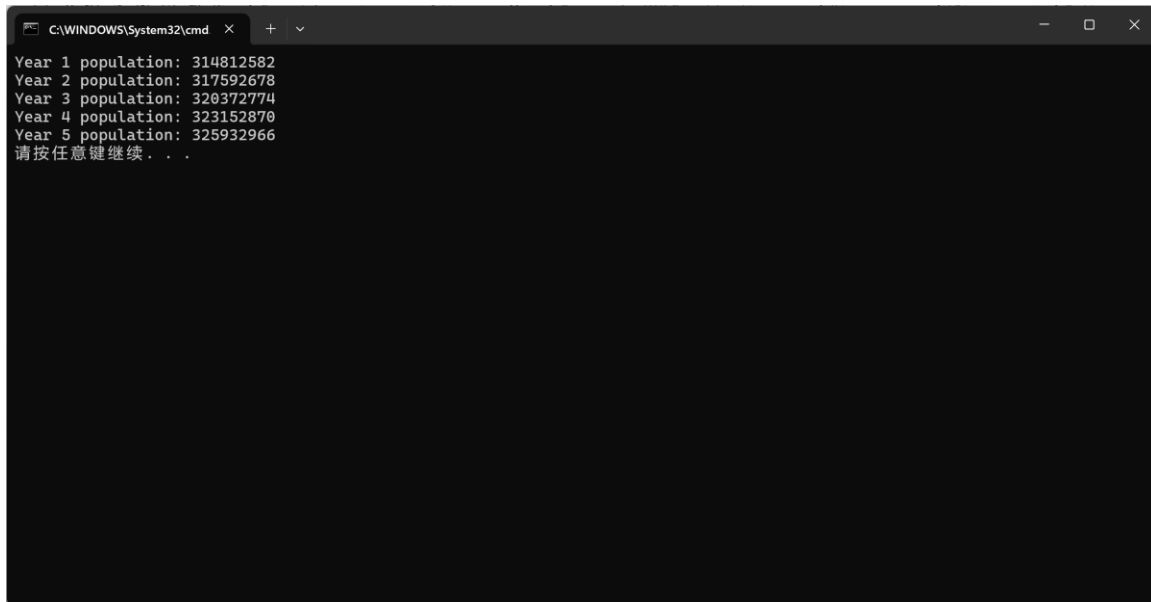
Answer

public class j {

   public static void main(String[] args) {

      int currentPopulation = 312032486;

      int secondsPerYear = 365 * 24 * 60 * 60;

      int birthsPerYear = secondsPerYear / 7;

      int deathsPerYear = secondsPerYear / 13;

      int immigrantsPerYear = secondsPerYear / 45;

      int netIncreasePerYear = birthsPerYear + immigrantsPerYear - deathsPerYear;

      for (int year = 1; year <= 5; year++) {

```
        currentPopulation += netIncreasePerYear;

        System.out.println("Year " + year + " population: " + currentPopulation);

    }

  }

}
```

```
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Year 1 population: 314812582
Year 2 population: 317592678
Year 3 population: 320372774
Year 4 population: 323152870
Year 5 population: 325932966
请按任意键继续. . .
```

Question 12.

1.12   (*Average speed in kilometers*) Assume that a runner runs **24** miles in **1** hour, **40** minutes, and **35** seconds. Write a program that displays the average speed in kilometers per hour. (Note **1** mile is equal to **1.6** kilometers.)

Answer

```java
public class AverageSpeedCalculator {

  public static void main(String[] args) {

    double miles = 24;

    int hours = 1;

    int minutes = 40;

    int seconds = 35;

    double kilometersPerMile = 1.6;

    double totalTimeHours = hours + minutes / 60.0 + seconds / 3600.0;

    double kilometers = miles * kilometersPerMile;
```

```
        double averageSpeedKilometersPerHour = kilometers / totalTimeHours;

        System.out.printf("average speed is: %.2f", averageSpeedKilometersPerHour);
    }
}
```



```
average speed is: 22.91
请按任意键继续. . .
```

Question 13.

1.13 (*Algebra: solve* 2×2 *linear equations*) You can use Cramer's rule to solve the following 2×2 system of linear equation provided that $ad - bc$ is not 0:

$$\begin{array}{l} ax + by = e \\ cx + dy = f \end{array} \quad x = \frac{ed - bf}{ad - bc} \quad y = \frac{af - ec}{ad - bc}$$

Write a program that solves the following equation and displays the value for x and y: (Hint: replace the symbols in the formula with numbers to compute x and y. This exercise can be done in Chapter 1 without using materials in later chapters.)

$$3.4x + 50.2y = 44.5$$
$$2.1x + .55y = 5.9$$

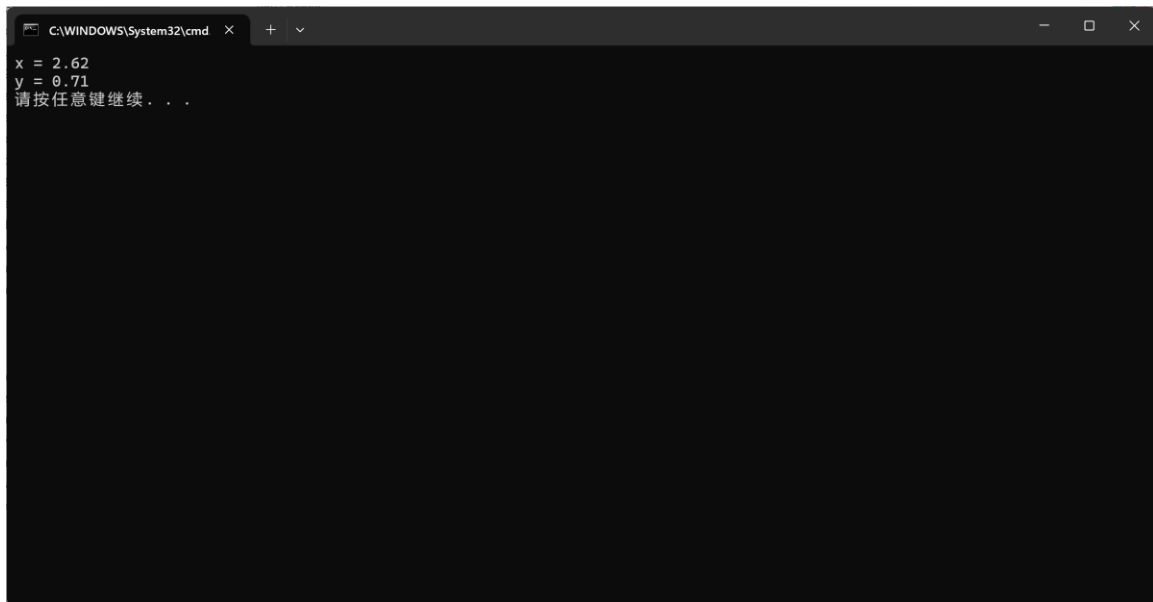## Answer

```
public class j {
    public static void main(String[] args) {
        double a = 3.4;
        double b = 50.2;
```

```java
        double c = 2.1;
        double d = 0.55;
        double e = 44.5;
        double f = 5.9;
        double denominator = a * d - b * c;
        if (denominator != 0) {

            double x = (e * d - b * f) / denominator;
            double y = (a * f - e * c) / denominator;

            System.out.printf("x = %.2f\n", x);
            System.out.printf("y = %.2f\n", y);
        } else {
            System.out.println("The equations have no solution.");
        }
    }
}
```