Part A. Multiple choices

1. Which of the following prints out floating-point numeric?

   a.
   ```
   int x = 10;
   int b = 22;
   System.out.println(x / b);
   ```
   b.
   ```
   int x = 10;
   int b = 22;
   System.out.println(b / x);
   ```
   c.
   ```
   float x = 10;
   int b = 20;
   System.out.println((int) x / b);
   ```
   d.
   ```
   float x = 10;
   int b = 20;
   System.out.println(b / (int) x);
   ```
   e.
   ```
   float x = (int) 10.00;
   float b = (int) 22.00;
   System.out.println(b / x);
   ```

2. Given `Scanner sc = new Scanner(System.in)` , which is the correct way to input an integer?

   a. `int a = sc.nextFloat();`
   b. `int a = (int) sc.nextFloat();`
   c. `int a = (int) sc.next();`
   d. `int a = (int) sc.nextLine();`
   e. None of the above

3. Given `String s = "Java Programming"`, choose all that print `JAVAing`

   a. `System.out.println(s.substring(0, 4));`
   b. `System.out.println(s.substring(0, 4).toUpperCase().concat(s.substring(13)));`
   c. `System.out.println(s.substring(0, 4).concat(s.substring(13).toUpperCase()));`
   d.
   ```
   System.out.println(s.substring(0, 4).toUpperCase() +
   s.substring(13).toLowerCase());
   ```
   e. `System.out.println("JAVAing");`

4. Which is variable assignment?

   a. `int a = 10;`
   b. `int a = "Hello, world";`
   c. `float a;`
   d. `a = "Good afternoon";`
   e. None of the above

5. In the program for calculating area of triangle below, what type of error will be found (if any)?

```java
import java.util.Scanner;

public class TriangleArea {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        double base = sc.nextDouble();
        double height = sc.nextDouble();
        double area = "0.6" * base * height;
        System.out.println(area);
    }
}
```

   a. Compile-time error
   b. Run-time error
   c. Logical error
   d. No error

6. Does Java use compiler or interpreter?
   a. Java uses compiler to compile source code into executable file.
   b. Java uses interpreter to interpret each line of source code.
   c. Java uses compiler to compile source code into bytecode, then uses interpreter to interpret the bytecode.
   d. Java uses interpreter to interpret source code into bytecode, then uses compiler to compile the bytecode into executable file.
   e. None of the above

7. Which of the following is an invalid variable name?
   a. `_hello_world_`
   b. `$$$M0n3Y$$$can_not$$$buy$$$y0u$$$_HAPPINESS$$$`
   c. `rosesareredvioletsarebluelovenevercrossedmyminduntilthedayimetyou`
   d. `1plus1_equals_1`
   e. All of the above

8. Which of the following equals 6?

    a. `2 + 4 % 3 + 1 - 2`
    b. `6 * 6 % 6 + 6 / 6 - 6 / 6`
    c. `1 + 2 - 3 + 4 - 5 + 6 + 7 % 6 % 9`
    d. `9 + 9 * 2 - 1 % 6 % 7`
    e. `4 - 5 * 9 % 6 - 7 + 25 % 8`

9. Given `int a = 2, b= 1` , choose all of the following that equal 9

    a. `a++ * (b+1) + b++`
    b. `++a + ++a + ++b + b++`
    c. `b++ + a++ + b++ + ++a`
    d. `a-- - --a + b++ + ++b - (a-- - 3)`
    e. `(((b++)*b++)*b++) + b++ - --a`

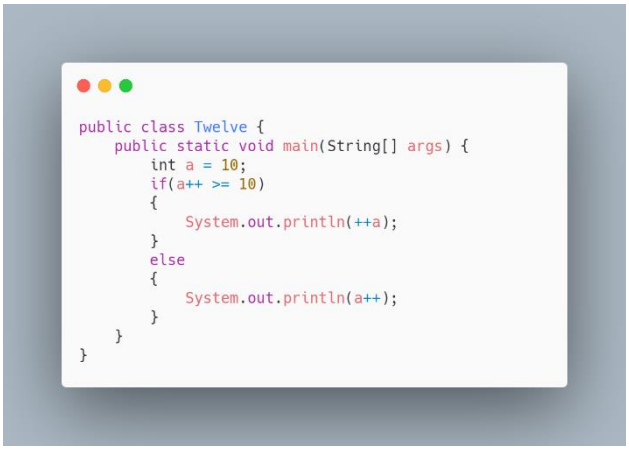
10. If we want to store 11-digit student ID , which data type should we use?

    a. `int`
    b. `float`
    c. `double`
    d. `string`
    e. `long`

11. If we want to change the string `Hakuna Matata` into `Hikuni Mititi`, which string method should we use?

    a. `substring`
    b. `concat`
    c. `indexOf`
    d. `charAt`
    e. `replace`

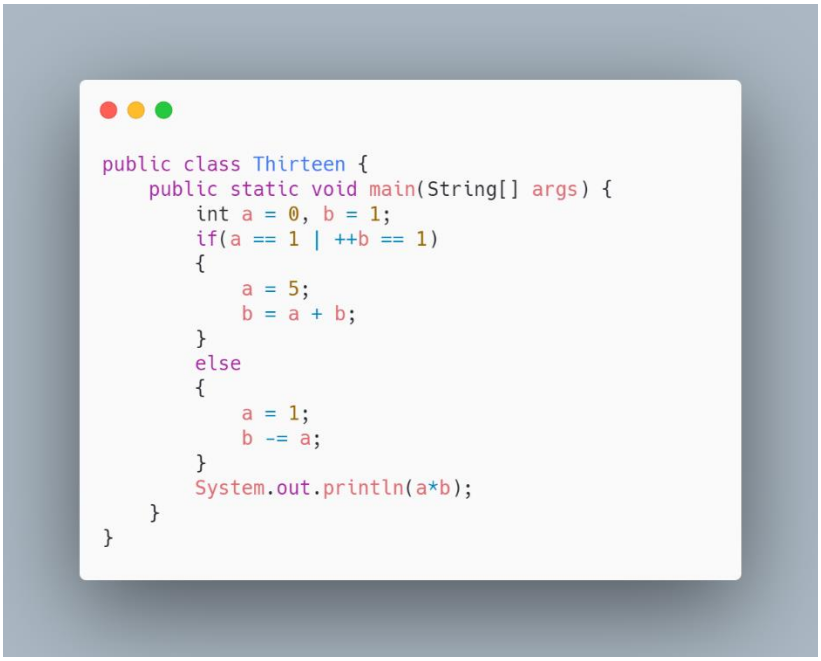
12. What will be the result of the following program?



```
public class Twelve {
    public static void main(String[] args) {
        int a = 10;
        if(a++ >= 10)
        {
            System.out.println(++a);
        }
        else
        {
            System.out.println(a++);
        }
    }
}
```

    a. 8 b. 9 c. 10 d. 11 e. 12

13. What is the result of the following program?



```
public class Thirteen {
    public static void main(String[] args) {
        int a = 0, b = 1;
        if(a == 1 | ++b == 1)
        {
            a = 5;
            b = a + b;
        }
        else
        {
            a = 1;
            b -= a;
        }
        System.out.println(a*b);
    }
}
```

    a. `-1`
    b. `0`
    c. `1`
    d. `2`
    e. `3`

14. What is the result of statement `a = (b>10) ? 100 : 1;` , when `b = 20`?

    a. `1`
    b. `11`
    c. `100`
    d. `101`
    e. `1001`

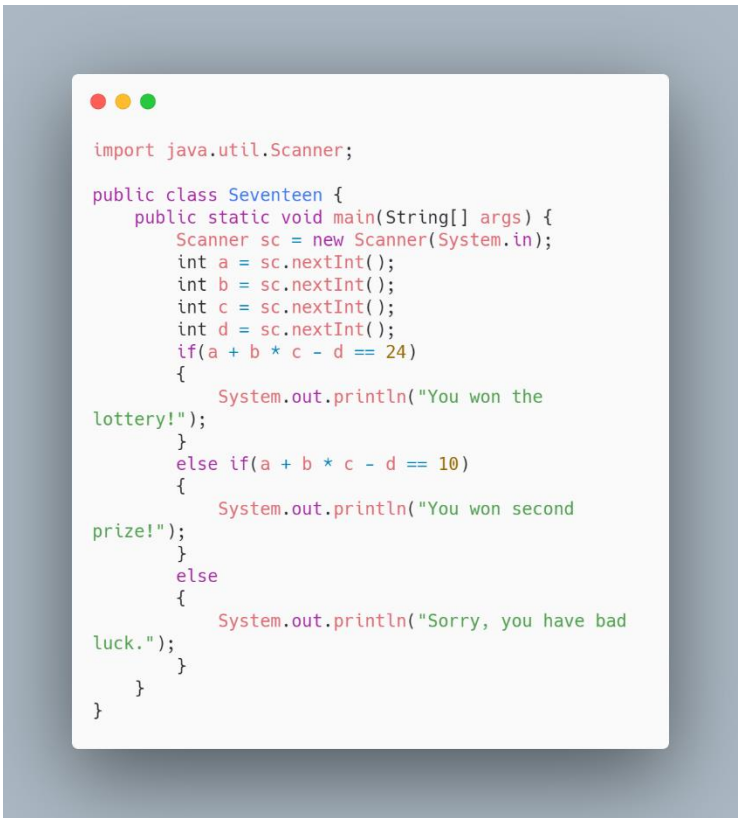
15. Given `String a = “Apple”, b = “Cat”` , what is the result of statement `a.compareTo(b)`?

    a. `-2`
    b. `-1`
    c. `0`
    d. `1`
    e. `2`

16. Given `String a = “Cat”, b = “Catfish”` , what is the result of statement `a.compareTo(b)`?

    a. `-1`
    b. `-2`
    c. `-3`
    d. `-4`

17. In the program below, which input would give the output `You won second prize!`?



```java
import java.util.Scanner;

public class Seventeen {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int a = sc.nextInt();
        int b = sc.nextInt();
        int c = sc.nextInt();
        int d = sc.nextInt();
        if(a + b * c - d == 24)
        {
            System.out.println("You won the
lottery!");
        }
        else if(a + b * c - d == 10)
        {
            System.out.println("You won second
prize!");
        }
        else
        {
            System.out.println("Sorry, you have bad
luck.");
        }
    }
}
```

a. `1 2 3 4`
b. `5 5 2 5`
c. `6 5 4 2`
d. `2 2 3 1`
e. `-1 -2 -5 3`

18. Suppose you write the code to display *"Cannot get a driver's license" if age is less than 18 and "Can get a driver's license" if age is greater than or equal to 18*. Which of the following code is the best?

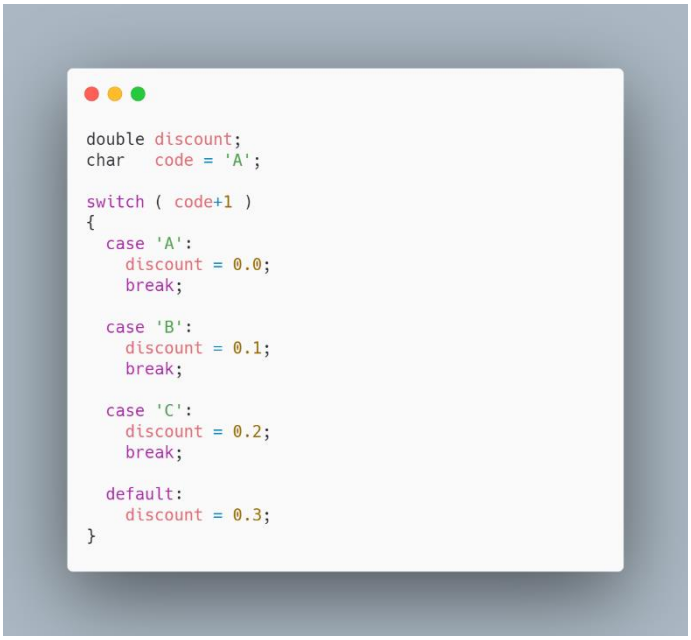
a.
```
if (age < 18)
        System.out.println("Cannot get a driver's license");
if (age >= 18)
        System.out.println("Can get a driver's license");
```

b.
```
if (age < 18)
        System.out.println("Cannot get a driver's license");
else
        System.out.println("Can get a driver's license");
```

c.
```
if (age < 18)
        System.out.println("Cannot get a driver's license");
else if (age >= 18)
        System.out.println("Can get a driver's license");
```

d.
```
if (age < 18)
        System.out.println("Cannot get a driver's license");
else if (age > 18)
        System.out.println("Can get a driver's license");
else if (age == 18)
        System.out.println("Can get a driver's license");
```

19. What value will be assigned to `discount`?



```
double discount;
char   code = 'A';

switch ( code+1 )
{
  case 'A':
    discount = 0.0;
    break;

  case 'B':
    discount = 0.1;
    break;

  case 'C':
    discount = 0.2;
    break;

  default:
    discount = 0.3;
}
```

a. `-0.1`
b. `0.0`
c. `0.1`
d. `0.2`
e. `0.3`

20. What is the result?

```
int x = 0;
int i = 1;

switch (i)
{
  case 1:
    x += i++
  case 2:
    x += i++ * 2
  case 3:
    x += i++ * 3
  default:
    x += i;
}
```

a. 1 b. 2 c. 3 d. 6 e. 18

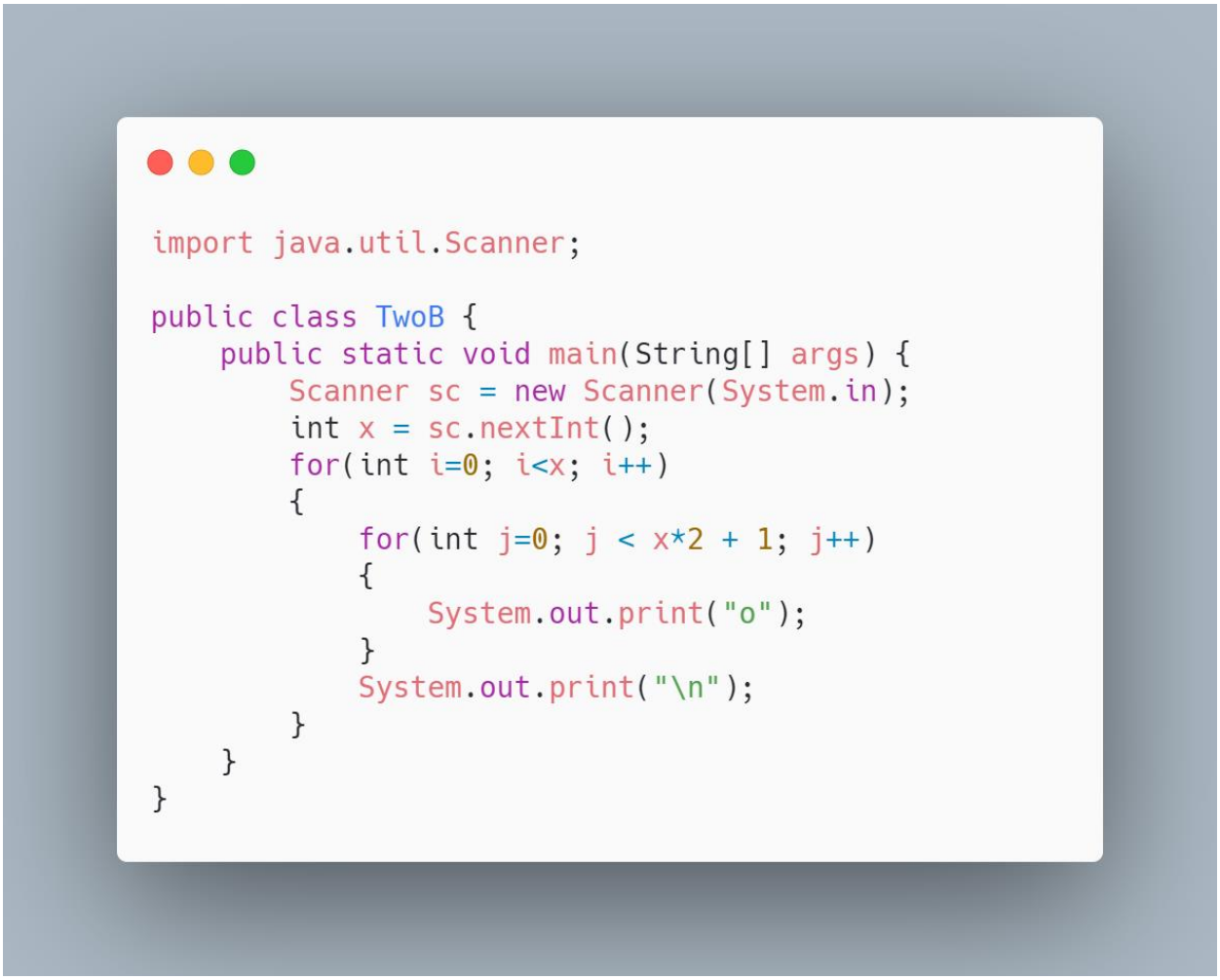
Part B. (Algorithm)

Write the output of each program.

1. Input x = 6

```java
import java.util.Scanner;

public class OneB {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int x = sc.nextInt();
        for(int i=0; i<x; i++)
        {
            System.out.println("*");
        }
    }
}
```

2. Input x=5



```java
import java.util.Scanner;

public class TwoB {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int x = sc.nextInt();
        for(int i=0; i<x; i++)
        {
            for(int j=0; j < x*2 + 1; j++)
            {
                System.out.print("o");
            }
            System.out.print("\n");
        }
    }
}
```

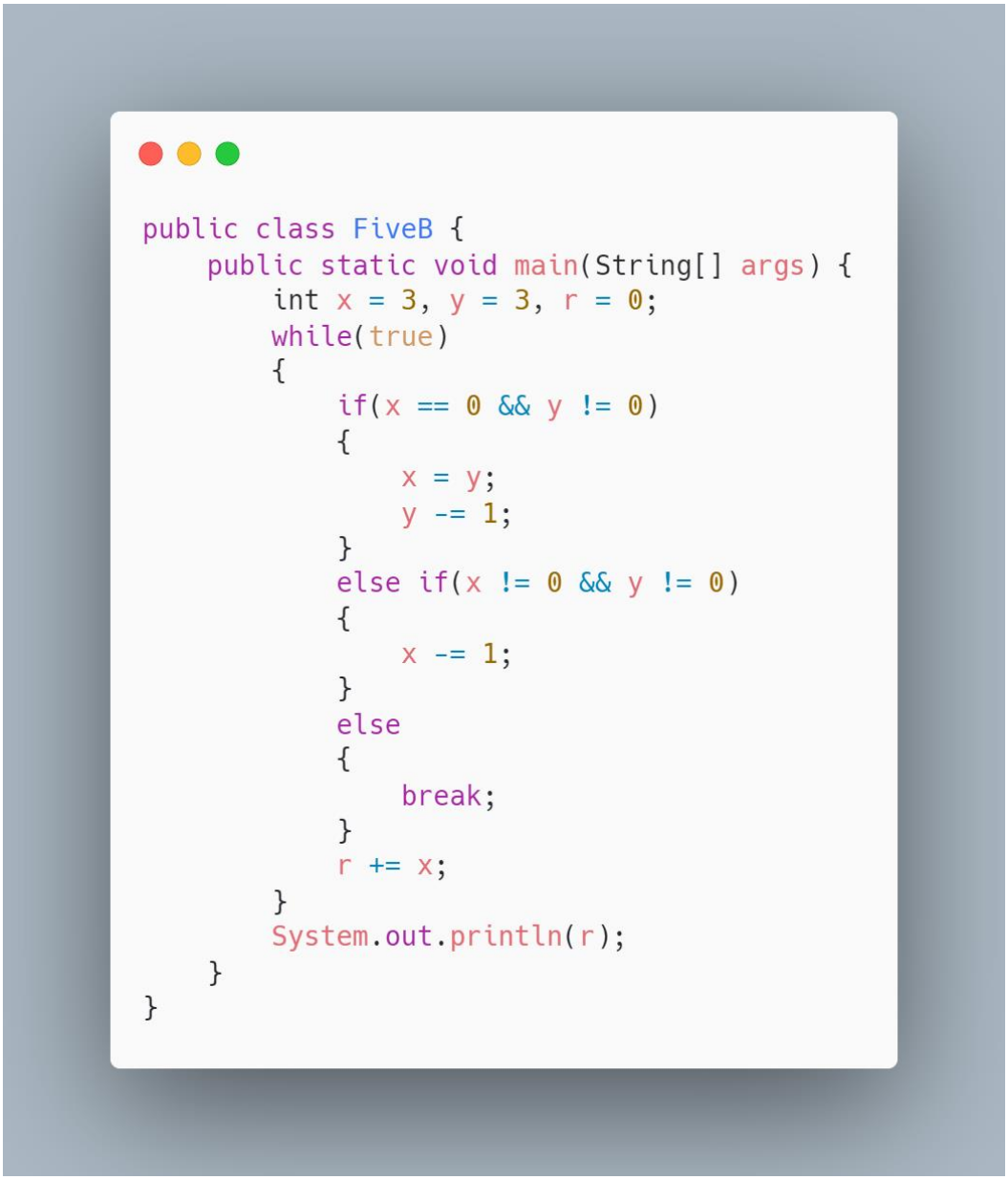
3. Input x = 4

```java
import java.util.Scanner;

public class ThreeB {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int x = sc.nextInt();
        for(int i=0; i<x; i++)
        {
            for(int j=0; j < x*2 + 1; j++)
            {
                if((i+j) % 2 == 0)
                {
                    System.out.print("o");
                }
                else
                {
                    System.out.print("x");
                }
            }
            System.out.print("\n");
        }
    }
}
```

4.

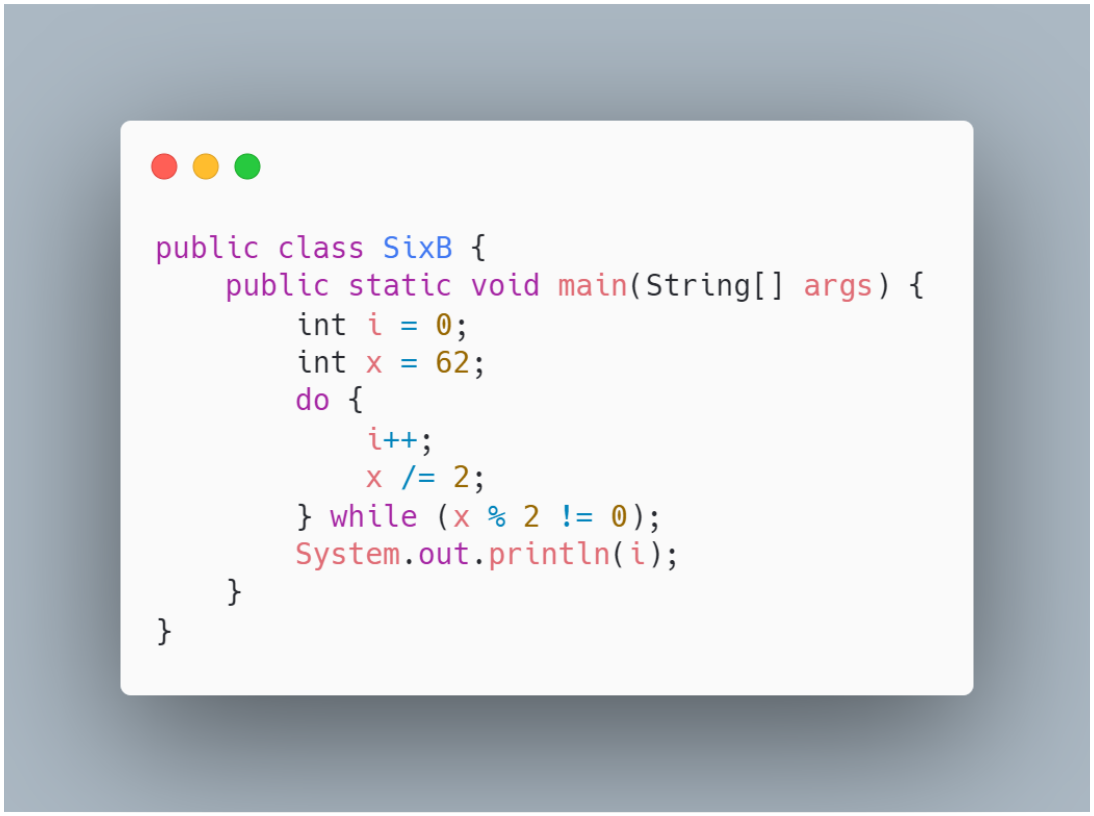
```java
public class FourB {
    public static void main(String[] args) {
        int x = 6;
        switch(x)
        {
            case 5:
                for(int i=0; i<x; i++)
                {
                    System.out.print("*");
                }
                System.out.print("\n");
                break;
            case 6:
                for(int i=0; i<x; i+=2)
                {
                    System.out.print("x");
                    x++;
                }
                System.out.print("\n");
            case 7:
                for(int i=x; i>0; i-=2)
                {
                    System.out.print("o");
                    i++;
                }
                System.out.print("\n");
            default:
                break;
        }
    }
}
```

5.



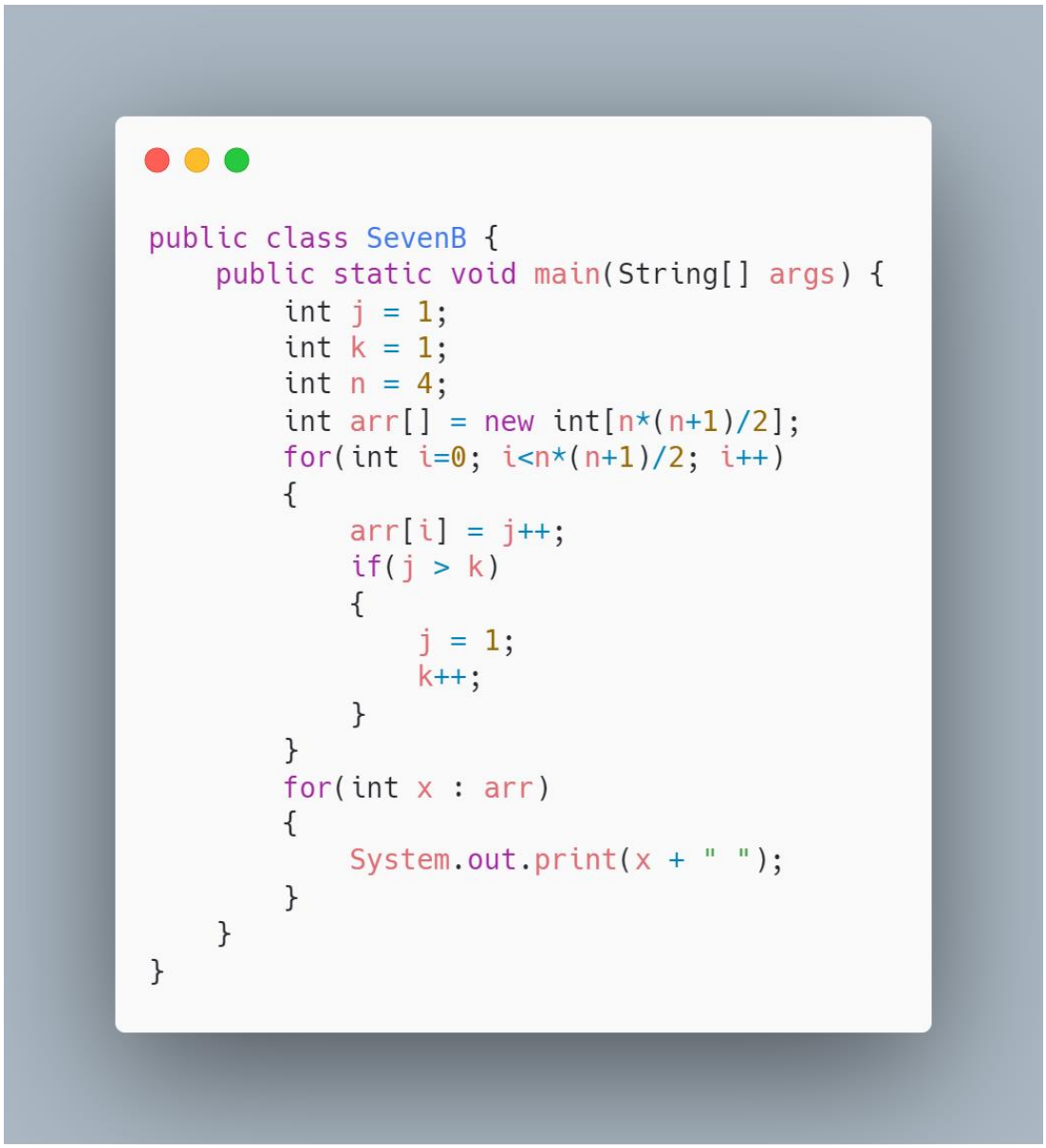
```java
public class FiveB {
    public static void main(String[] args) {
        int x = 3, y = 3, r = 0;
        while(true)
        {
            if(x == 0 && y != 0)
            {
                x = y;
                y -= 1;
            }
            else if(x != 0 && y != 0)
            {
                x -= 1;
            }
            else
            {
                break;
            }
            r += x;
        }
        System.out.println(r);
    }
}
```

6.



```java
public class SixB {
    public static void main(String[] args) {
        int i = 0;
        int x = 62;
        do {
            i++;
            x /= 2;
        } while (x % 2 != 0);
        System.out.println(i);
    }
}
```

7.



```java
public class SevenB {
    public static void main(String[] args) {
        int j = 1;
        int k = 1;
        int n = 4;
        int arr[] = new int[n*(n+1)/2];
        for(int i=0; i<n*(n+1)/2; i++)
        {
            arr[i] = j++;
            if(j > k)
            {
                j = 1;
                k++;
            }
        }
        for(int x : arr)
        {
            System.out.print(x + " ");
        }
    }
}
```

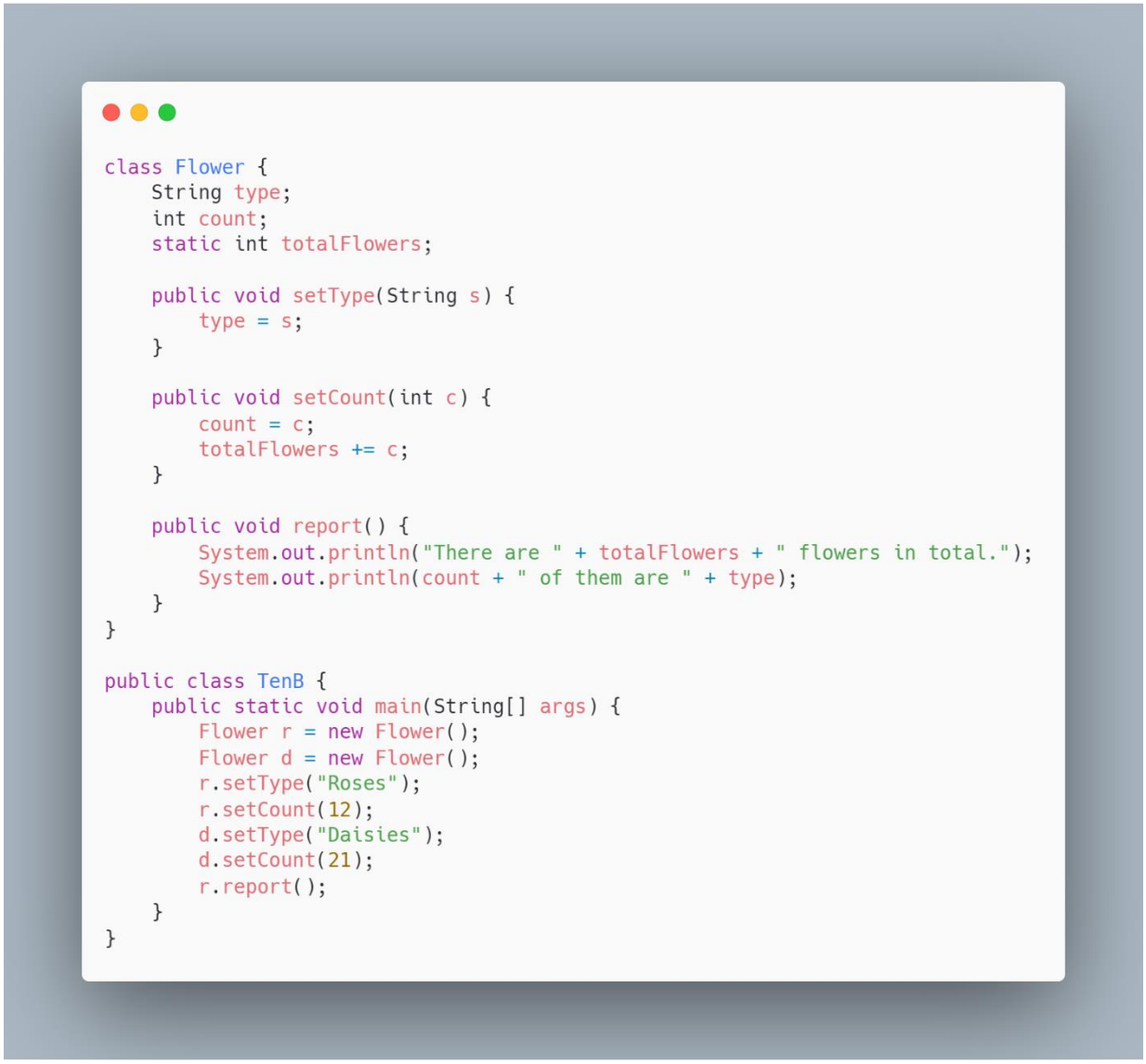
8.

```java
public class EightB {
    public static void main(String[] args) {
        char[] secret = {'j', 'p', 'r', 'w', 'i', 'z', 'p', 'y'};
        int[] password = {1, 4, 3};
        for(int i=0; i<8; i++)
        {
            secret[i] -= (i == 5) ? password[0] : password[i % 3];
        }
        System.out.print(secret);
    }
}
```

9.

```java
public class NineB {
    public static void main(String[] args) {
        int arr[][] = {
                {1, 2, 3, 4},
                {5, 6, 7, 8},
                {9, 10, 11, 12},
                {13, 14, 15, 16},
        };

        for(int i=0; i<4; i++)
        {
            if(i % 2 == 0)
            {
                for(int j=0; j<4; j++)
                {
                    System.out.print(arr[i][j] + " ");
                }
            }
            else
            {
                for(int j=3; j>=0; j--)
                {
                    System.out.print(arr[i][j] - 4 + " ");
                }
            }
            System.out.print("\n");
        }
    }
}
```

10.



```java
class Flower {
    String type;
    int count;
    static int totalFlowers;

    public void setType(String s) {
        type = s;
    }

    public void setCount(int c) {
        count = c;
        totalFlowers += c;
    }

    public void report() {
        System.out.println("There are " + totalFlowers + " flowers in total.");
        System.out.println(count + " of them are " + type);
    }
}

public class TenB {
    public static void main(String[] args) {
        Flower r = new Flower();
        Flower d = new Flower();
        r.setType("Roses");
        r.setCount(12);
        d.setType("Daisies");
        d.setCount(21);
        r.report();
    }
}
```

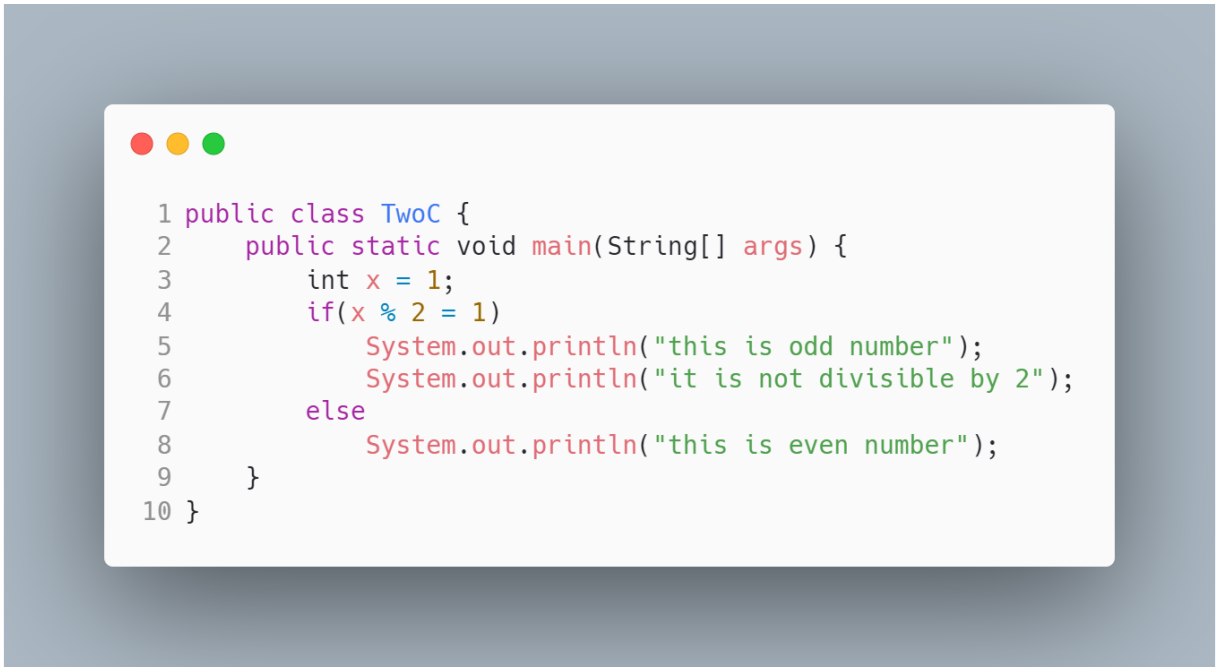
Part C. (Error identification)

Find and correct the error in each program (There can be more than one error).

1.

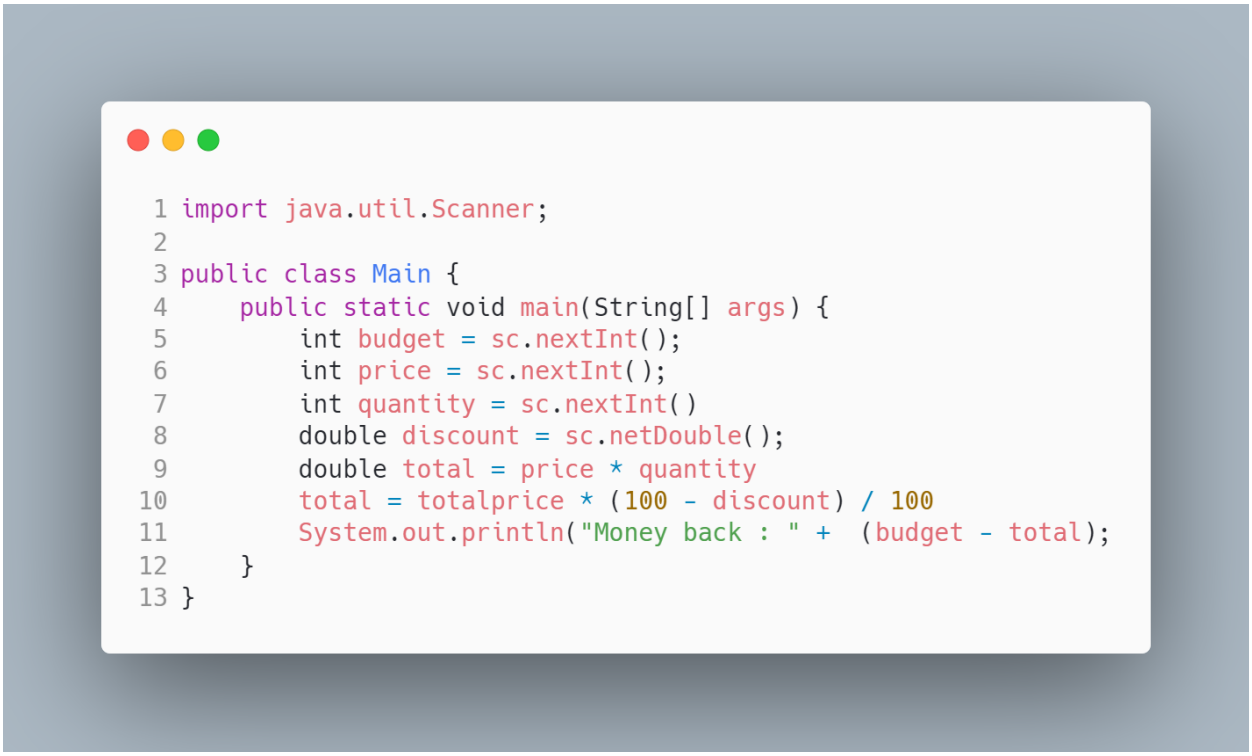
```java
import java.util.Scanner;

public class OneC {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        String n = nextLine();
        System.out.println(n)
    }
}
```

2.



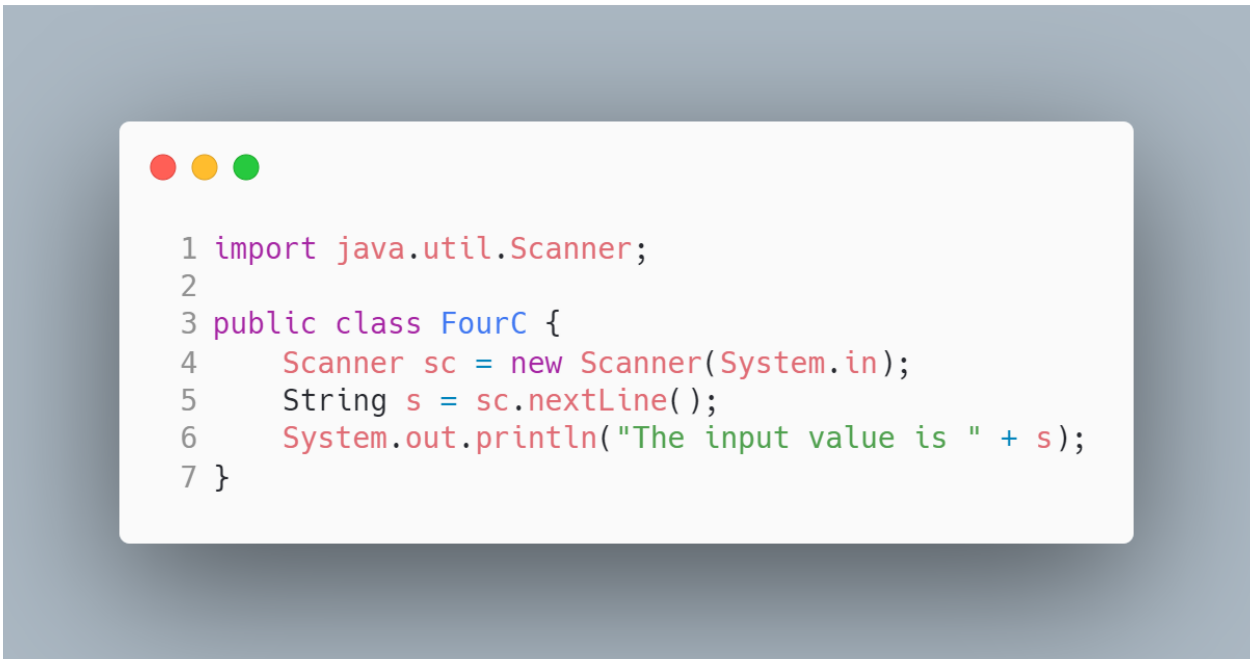
```java
public class TwoC {
    public static void main(String[] args) {
        int x = 1;
        if(x % 2 = 1)
            System.out.println("this is odd number");
            System.out.println("it is not divisible by 2");
        else
            System.out.println("this is even number");
    }
}
```

3.



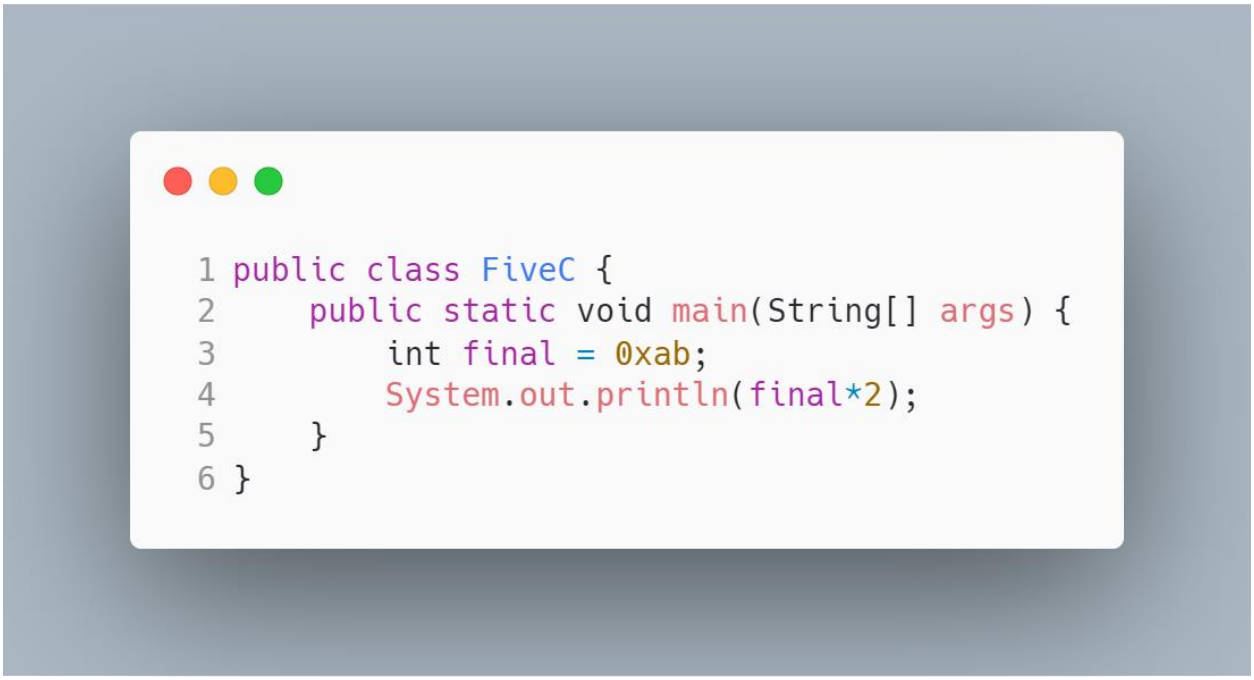
```java
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        int budget = sc.nextInt();
        int price = sc.nextInt();
        int quantity = sc.nextInt()
        double discount = sc.netDouble();
        double total = price * quantity
        total = totalprice * (100 - discount) / 100
        System.out.println("Money back : " +  (budget - total);
    }
}
```

4.



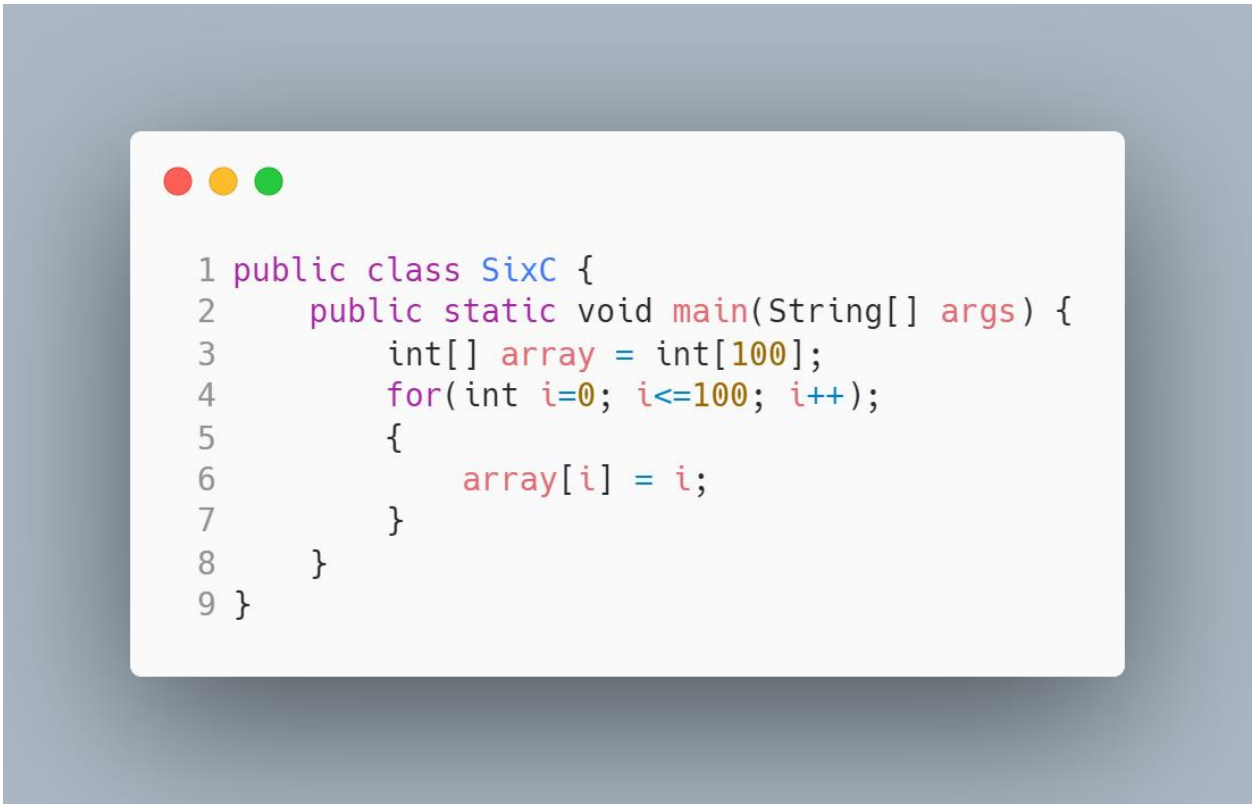
```java
import java.util.Scanner;

public class FourC {
    Scanner sc = new Scanner(System.in);
    String s = sc.nextLine();
    System.out.println("The input value is " + s);
}
```

5.



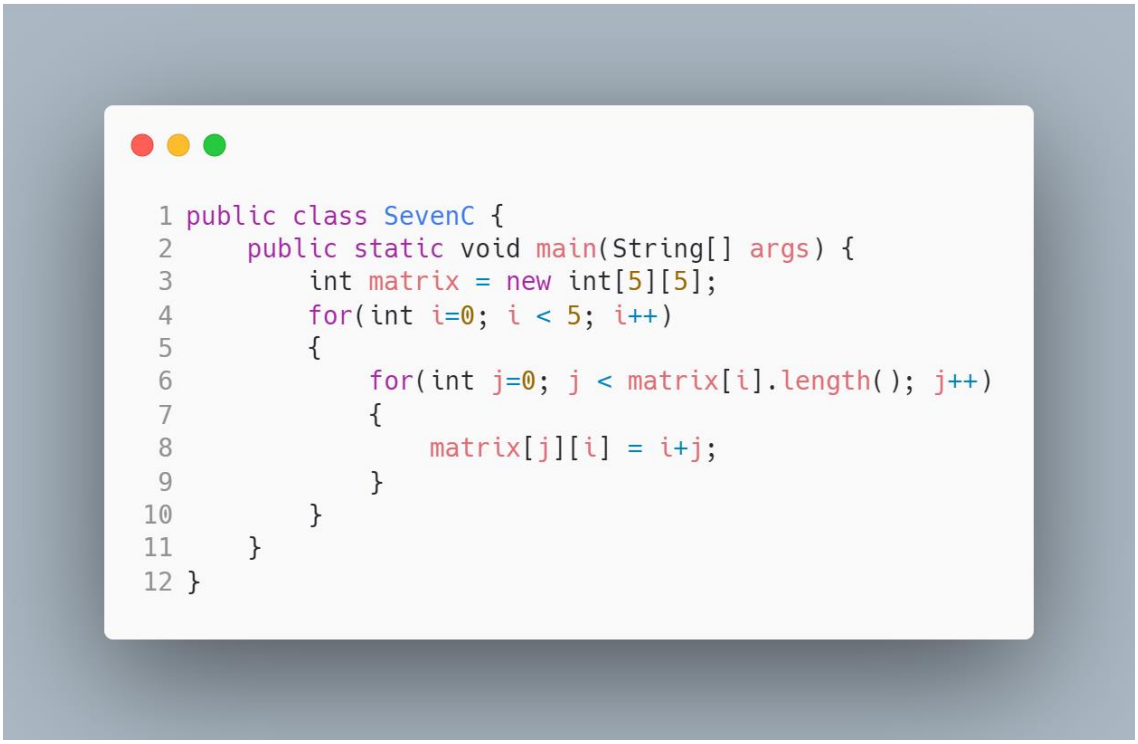
```java
public class FiveC {
    public static void main(String[] args) {
        int final = 0xab;
        System.out.println(final*2);
    }
}
```

6.



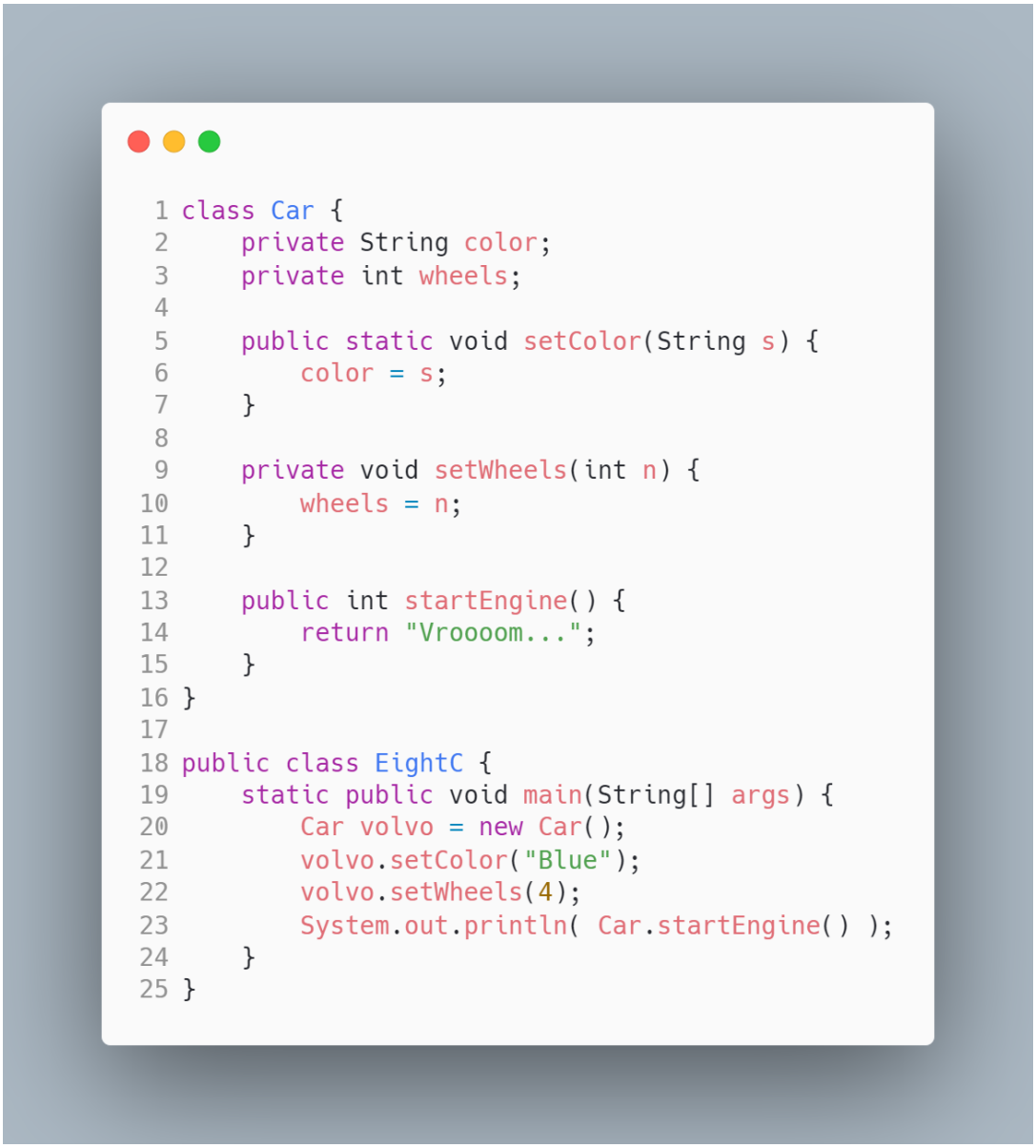
```java
public class SixC {
    public static void main(String[] args) {
        int[] array = int[100];
        for(int i=0; i<=100; i++);
        {
            array[i] = i;
        }
    }
}
```

7.



```java
public class SevenC {
    public static void main(String[] args) {
        int matrix = new int[5][5];
        for(int i=0; i < 5; i++)
        {
            for(int j=0; j < matrix[i].length(); j++)
            {
                matrix[j][i] = i+j;
            }
        }
    }
}
```

8.



```java
class Car {
    private String color;
    private int wheels;

    public static void setColor(String s) {
        color = s;
    }

    private void setWheels(int n) {
        wheels = n;
    }

    public int startEngine() {
        return "Vroooom...";
    }
}

public class EightC {
    static public void main(String[] args) {
        Car volvo = new Car();
        volvo.setColor("Blue");
        volvo.setWheels(4);
        System.out.println( Car.startEngine() );
    }
}
```

Answer key

Part A

1. E
2. B
3. BDE
4. D
5. A
6. C
7. D
8. C
9. CDE
10. D
11. E
12. E
13. C
14. C
15. A
16. D
17. B
18. B
19. C
20. E

Part B

1.

```
*
*
*
*
*
*
```

2.

```
oooooooooooo
oooooooooooo
oooooooooooo
oooooooooooo
oooooooooooo
```

3.

```
oxoxoxoxo
oxoxoxoxo
oxoxoxoxo
oxoxoxoxo
```

4.

```
xxxxxx
oooooooooooo
```

5. 13

6. 6

7. 1 1 2 1 2 3 1 2 3 4

8. iloveyou

9.

```
1 2 3 4
4 3 2 1
9 10 11 12
12 11 10 9
```

10.

```
There are 33 flowers in total.
12 of them are Roses
```

Part C

1. Line 6: Should be `sc.nextLine();`

   Line 7: Missing semicolon (;)

2. Line 4: Should be `x%2==1` (two equal signs)

   Line 5-6: Multiple statements for if-else block should be grouped in { } brackets

3. Scanner sc is not declared yet

   Line 7: Missing semicolon (;)

   Line 8: Should be `sc.nextDouble();`

   Line 9-10: Missing semicolon (;)

   Line 10: There is no variable named `totalprice`

   Line 11: Missing one more closing parenthesis

4. Line 4-6: These statements should be put inside main method

5. Line 3: `final` is a reserved word and cannot be used as variable name

6. Line 3: Should be `new int[100]`

   Line 4: Should be `i<100` (Index out of bound)

7. Line 3: Should be either `int[][] matrix` or `int matrix[][]`

   Line 6: Should be `matrix[i].length` (without parentheses)

8. Line 6: `setColor` is a static method and can only access static variable, which `color` is not

   Line 14: `"Vroooom…"` is String but `startEngine` method is defined to return `int`

   Line 22: `setWheels` is a private method and cannot be accessed from there

   Line 23: `startEngine` is not a static method and cannot be called like that (should be `volvo.startEngine()`)

Good luck have fun. :)