# Week-1

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1. Given an input integer, you must determine which primitive data types are capable of properly storing that input.

Input Format
The first line contains an integer, , denoting the number of test cases. Each test case, is comprised of a single line with an integer, , which can be arbitrarily large or small.

pgm - Notepad

File Edit Format View Help

```
import java.util.*;

public class pgm{
        public static void main(String args[]){
        Scanner sc = new Scanner(System.in);
        int t=sc.nextInt();

        for(int i=0 ; i<t ; i++){
                try {
                        long x = sc.nextLong();
                        System.out.println(x + " can be fitted in:");
                        if(x>=-128 && x<=127)
                                System.out.println(" byte");
                        if(x>=-32768 && x<=32767)
                                System.out.println(" short");
                        if(x>=-(int)Math.pow(2,31) && x<=(int)Math.pow(2,31))
                                System.out.println(" int");
                        if(x>=-(long)Math.pow(2,63) && x<=(long)Math.pow(2,63))
                                System.out.println(" long");
                }
                catch(Exception e){
                        System.out.println("Can't be fitted anywhere.");
                }
                System.out.println();
        }
```

C:\Windows\System32\cmd.exe

```
Microsoft Windows [Version 10.0.21996.1]
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C:\Users\Lenovo\Desktop\230701306>javac pgm.java

C:\Users\Lenovo\Desktop\230701306>java pgm
5
12000
12000 can be fitted in:
 short
 int
 long

12354687
12354687 can be fitted in:
 int
 long

999000999000999
999000999000999 can be fitted in:
 long

100000000000000000000
Can't be fitted anywhere.

Can't be fitted anywhere.


C:\Users\Lenovo\Desktop\230701306>
```

2. You are developing a financial application that needs to handle both whole numbers and decimal values. The application takes user inputs as integers (e.g., representing amounts in cents) and needs to convert them to double for further calculations (e.g., converting cents to dollars).

pgm - Notepad

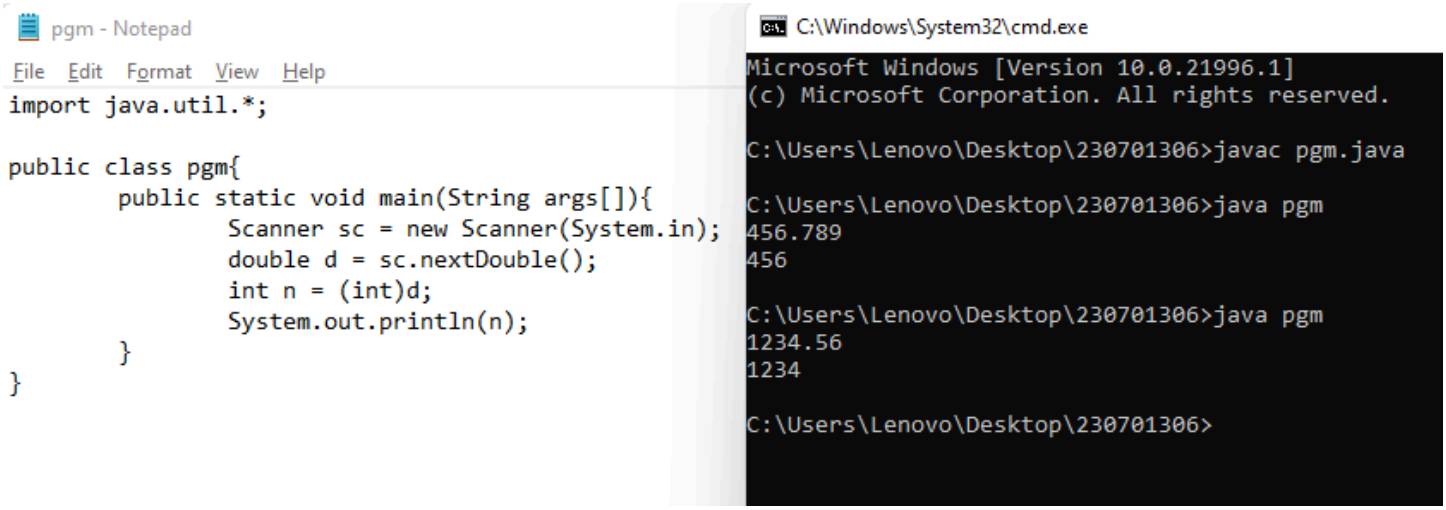
File Edit Format View Help

```
import java.util.*;

public class pgm{
        public static void main(String args[]){
                Scanner sc = new Scanner(System.in);
                int n = sc.nextInt();
                double d = n/100.0;
                System.out.format("$%.2f",d);
        }
}
```

C:\Windows\System32\cmd.exe

```
Microsoft Windows [Version 10.0.21996.1]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Lenovo\Desktop\230701306>javac pgm.java

C:\Users\Lenovo\Desktop\230701306>java pgm
452
$4.52
C:\Users\Lenovo\Desktop\230701306>java pgm
62
$0.62
C:\Users\Lenovo\Desktop\230701306>java pgm
98542
$985.42
C:\Users\Lenovo\Desktop\230701306>
```

3. In a game, the player's score is calculated as a double value with high precision. However, for display purposes, you need to show the score as an integer.



pgm - Notepad

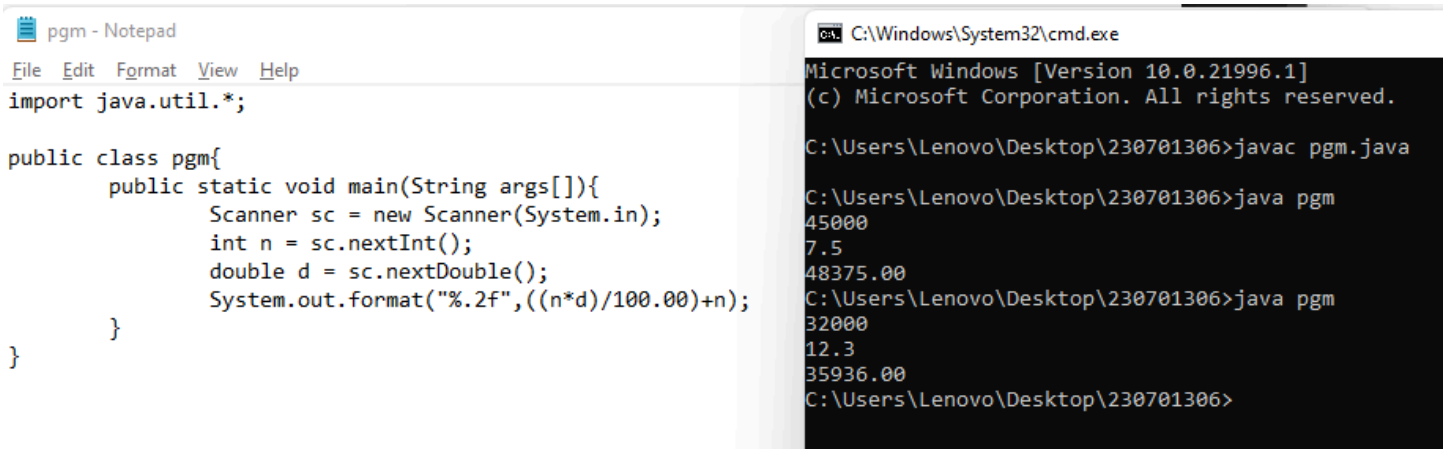
File Edit Format View Help

```
import java.util.*;

public class pgm{
        public static void main(String args[]){
                Scanner sc = new Scanner(System.in);
                double d = sc.nextDouble();
                int n = (int)d;
                System.out.println(n);
        }
}
```

C:\Windows\System32\cmd.exe

```
Microsoft Windows [Version 10.0.21996.1]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Lenovo\Desktop\230701306>javac pgm.java

C:\Users\Lenovo\Desktop\230701306>java pgm
456.789
456

C:\Users\Lenovo\Desktop\230701306>java pgm
1234.56
1234

C:\Users\Lenovo\Desktop\230701306>
```

4. You are developing a payroll system where you need to calculate the adjusted salary based on a percentage increase. The initial salary is given as an int, and the percentage increase is given as a double.



pgm - Notepad

File Edit Format View Help

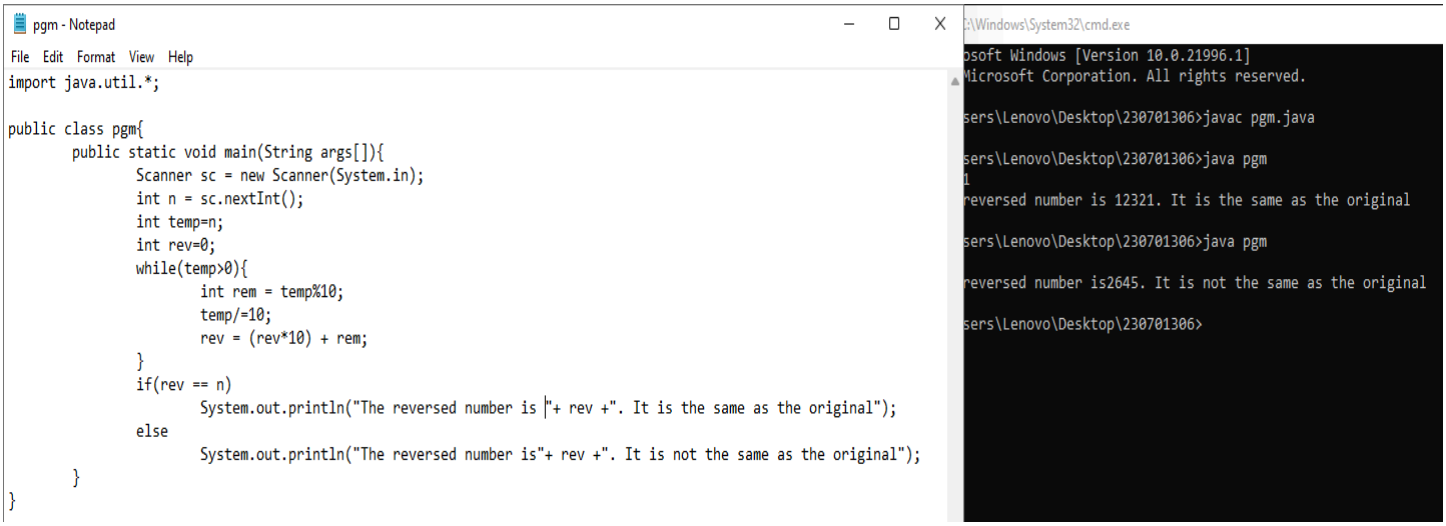
```
import java.util.*;

public class pgm{
        public static void main(String args[]){
                Scanner sc = new Scanner(System.in);
                int n = sc.nextInt();
                double d = sc.nextDouble();
                System.out.format("%.2f",((n*d)/100.00)+n);
        }
}
```

C:\Windows\System32\cmd.exe

```
Microsoft Windows [Version 10.0.21996.1]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Lenovo\Desktop\230701306>javac pgm.java

C:\Users\Lenovo\Desktop\230701306>java pgm
45000
7.5
48375.00
C:\Users\Lenovo\Desktop\230701306>java pgm
32000
12.3
35936.00
C:\Users\Lenovo\Desktop\230701306>
```

5. Question - 1. A mobile application for a puzzle game requires players to reverse the digits of a given number to form a new number. The goal is to check if the reversed number is equal to the original number.

Task: Write a Java program that reads an integer and reverses its digits. Check if the reversed number is the same as the original.



pgm - Notepad

File Edit Format View Help

```
import java.util.*;

public class pgm{
	public static void main(String args[]){
		Scanner sc = new Scanner(System.in);
		int n = sc.nextInt();
		int temp=n;
		int rev=0;
		while(temp>0){
			int rem = temp%10;
			temp/=10;
			rev = (rev*10) + rem;
		}
		if(rev == n)
			System.out.println("The reversed number is "+ rev +". It is the same as the original");
		else
			System.out.println("The reversed number is"+ rev +". It is not the same as the original");
	}
}
```

C:\Windows\System32\cmd.exe

```
osoft Windows [Version 10.0.21996.1]
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sers\Lenovo\Desktop\230701306>javac pgm.java

sers\Lenovo\Desktop\230701306>java pgm
1
reversed number is 12321. It is the same as the original

sers\Lenovo\Desktop\230701306>java pgm

reversed number is2645. It is not the same as the original

sers\Lenovo\Desktop\230701306>
```
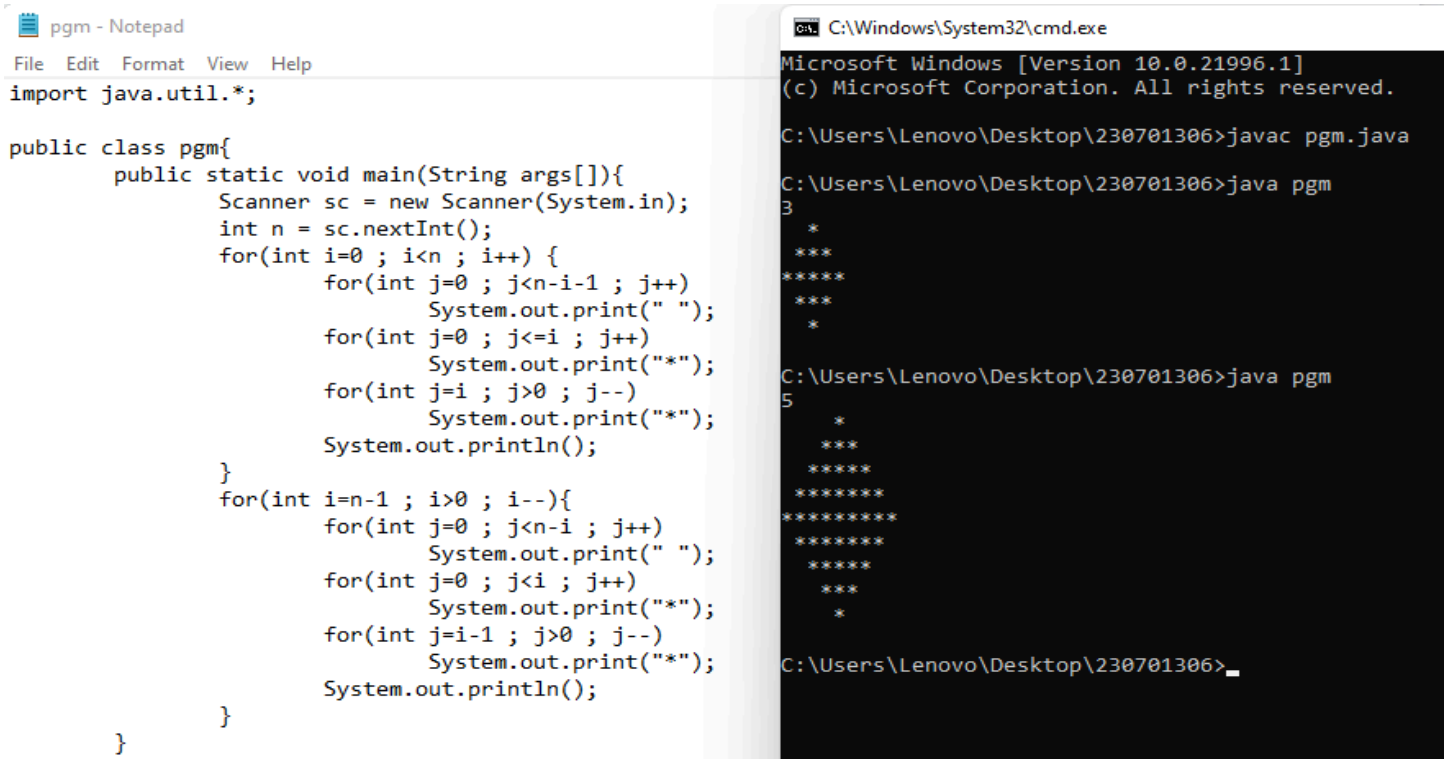

6. Question - 2. A graphics tool allows users to create complex shapes for designs. One of the patterns you need to implement is a diamond shape using stars (*). The user provides the number of rows in the top half of the diamond.
   Task: Write a Java program that takes an integer n and prints a diamond pattern.



pgm - Notepad

File Edit Format View Help

```
import java.util.*;

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

C:\Windows\System32\cmd.exe

```
Microsoft Windows [Version 10.0.21996.1]
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C:\Users\Lenovo\Desktop\230701306>javac pgm.java

C:\Users\Lenovo\Desktop\230701306>java pgm
3
  *
 ***
*****
 ***
  *

C:\Users\Lenovo\Desktop\230701306>java pgm
5
    *
   ***
  *****
 *******
*********
 *******
  *****
   ***
    *

C:\Users\Lenovo\Desktop\230701306>
```

7. Task: Write a Java program that prints a half-diamond pattern where each row contains elements from Pascal's Triangle up to the middle row. For a given integer n, generate a pattern with 2n-1 rows. The first n rows should display the elements of Pascal's Triangle in increasing order, while the next n-1 rows should display them in decreasing order, forming a half-diamond. Pascal's Triangle is a triangular array of binomial coefficients. The value at position (i, j) in Pascal's Triangle is computed as C(i, j), where C(i, j) = i! / (j! * (i -j)!).

pgm.java

File Edit View

```
public class pgm{
        public static void main(String args[]){
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
                for(int i=0 ; i<n ; i++){
                        for(int j=0 ; j<n-i-1 ; j++)
                                System.out.print(" ");
                        for(int j=0 ; j<=i ; j++)
                                System.out.print(" " + fact(i)/(fact(j)*fact(i-j)));
                        System.out.println();
                }
        for(int i=n-2 ; i>=0 ; i--) {
            for(int j=n-i ; j>0 ; j--)
                System.out.print(" ");
            System.out.print("1");
            for(int j=i-1 ; j>=0 ; j--)
                System.out.print(" " + fact(i)/(fact(j)*fact(i-j)));
            System.out.println();
        }
        }

        public static int fact(int n){
                if(n==0)
            return 1;
        return (n*fact(n-1));
        }
}
```

C:\Windows\System32\cmd.e

```
Microsoft Windows [Version 10.0.22631.3880]
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C:\Users\shank\OneDrive\Desktop\code>javac pgm.java

C:\Users\shank\OneDrive\Desktop\code>java pgm
4
    1
   1 1
  1 2 1
 1 3 3 1
  1 2 1
   1 1
    1

C:\Users\shank\OneDrive\Desktop\code>java pgm
5
     1
    1 1
   1 2 1
  1 3 3 1
 1 4 6 4 1
  1 3 3 1
   1 2 1
    1 1
     1

C:\Users\shank\OneDrive\Desktop\code>S
```

8. Question - 4. We use the integers a, b, and n to create the following series:
   (a+20.b), (a+20.b+21.b),...,(a+20.b+21.b+.....+2n-1.b)
   You are given q queries in the form of a, b, and n. For each query, print the series corresponding to the given a, b, and n values as a single line of n space-separated integers.

pgm.java

File Edit View

```
public class pgm{
        public static void main(String args[]){
                Scanner sc = new Scanner(System.in);
                int t = sc.nextInt();
                while(t>0){
                        int a = sc.nextInt();
                        int b = sc.nextInt();
                        int n = sc.nextInt();
                        int x = 0;
                        int y = 0;
                        int sum = 0;

                        while(x < n){
                                if(x == 0){
                                        y = 1;
                                        sum = a + (y*b) + sum;
                                }else{
                                        y *= 2;
                                        sum = (y * b) + sum;
                                }
                                System.out.print (sum + " ");
                                x += 1;
                        }
                        t--;
                }
        }
}
```

C:\Windows\System32\cmd.e

```
Microsoft Windows [Version 10.0.22631.3880]
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C:\Users\shank\OneDrive\Desktop\code>javac pgm.java

C:\Users\shank\OneDrive\Desktop\code>java pgm
2
0 2 10
2 6 14 30 62 126 254 510 1022 2046
5 3 5
8 14 26 50 98
C:\Users\shank\OneDrive\Desktop\code>
```