Special Numbers

You said:

Strong Number
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③ Armstrong Number
④ Harshad Number
⑤ Kaprekar Number
⑥ Lychrel Number
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②④ Evil Number
②⑤ Amicable Pairs

explain all in short with example give individual and simple code of each in java

ChatGPT said:

Here's a brief explanation of each number type, along with simple Java code for each one:

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① Strong Number

A **Strong Number** is a number where the sum of the factorial of its digits equals the number itself.
Example:
145 = 1! + 4! + 5! = 145
Java Code:

```java
import java.util.Scanner;

public class StrongNumber {
    public static int factorial(int n) {
        int fact = 1;
        for (int i = 2; i <= n; i++) {
            fact *= i;
        }
        return fact;
    }

    public static boolean isStrong(int num) {
        int temp = num, sum = 0;
        while (temp > 0) {
            sum += factorial(temp % 10);
            temp /= 10;
        }
        return sum == num;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isStrong(num) ? num + " is a Strong Number" : num + " is not a Strong Number");
    }
}
```

---

② Perfect Number

A **Perfect Number** is a number that is equal to the sum of its proper divisors (excluding itself).
Example:
28 = 1 + 2 + 4 + 7 + 14
Java Code:

```java
import java.util.Scanner;

public class PerfectNumber {
    public static boolean isPerfect(int num) {
        int sum = 0;
        for (int i = 1; i <= num / 2; i++) {
            if (num % i == 0) {
                sum += i;
            }
        }
        return sum == num;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isPerfect(num) ? num + " is a Perfect Number" : num + " is not a Perfect Number");
    }
}
```

---

③ Armstrong Number

An **Armstrong Number** is a number that is equal to the sum of its digits each raised to the power of the number of digits.

Example:

$153 = 1^3 + 5^3 + 3^3 = 153$

Java Code:

```java
import java.util.Scanner;

public class ArmstrongNumber {
    public static boolean isArmstrong(int num) {
        int temp = num, sum = 0, digits = String.valueOf(num).length();
        while (temp > 0) {
            sum += Math.pow(temp % 10, digits);
            temp /= 10;
        }
        return sum == num;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isArmstrong(num) ? num + " is an Armstrong Number" : num + " is
not an Armstrong Number");
    }
}
```

---

④ Harshad Number

A **Harshad Number** is a number that is divisible by the sum of its digits.

Example:

18 → 1 + 8 = 9, and 18 is divisible by 9

Java Code:

```java
import java.util.Scanner;

public class HarshadNumber {
    public static boolean isHarshad(int num) {
        int sum = 0, temp = num;
        while (temp > 0) {
            sum += temp % 10;
            temp /= 10;
        }
        return num % sum == 0;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isHarshad(num) ? num + " is a Harshad Number" : num + " is not
a Harshad Number");
    }
}
```

---

⑤ Kaprekar Number

A **Kaprekar Number** is a number whose square, when split into two parts, adds up to the original number.
Example:
$45^2 = 2025$ → 20 + 25 = 45
Java Code:

```java
import java.util.Scanner;

public class KaprekarNumber {
    public static boolean isKaprekar(int num) {
        int sq = num * num;
        String sqStr = String.valueOf(sq);
        int len = sqStr.length();
        int left = (len == 1) ? 0 : Integer.parseInt(sqStr.substring(0, len / 2));
        int right = Integer.parseInt(sqStr.substring(len / 2));
        return left + right == num;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isKaprekar(num) ? num + " is a Kaprekar Number" : num + " is
not a Kaprekar Number");
    }
}
```

I can continue providing explanations and Java code for each of the remaining number types. Would you like me to proceed in this manner or combine several of them into one response?

You said:

give remaining

ChatGPT said:

Here are the remaining number types with short explanations and Java code examples:

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⑥ Lychrel Number

A **Lychrel Number** is a number that does not form a palindrome through the iterative process of repeatedly reversing its digits and adding the result. It's suspected that some numbers, like 196, may be Lychrel numbers.
Example:
196 is suspected to be a Lychrel number as it hasn't formed a palindrome even after many iterations.
Java Code:

```java
import java.math.BigInteger;
import java.util.Scanner;

public class LychrelNumber {
    public static boolean isPalindrome(BigInteger num) {
        String str = num.toString();
        return str.equals(new StringBuilder(str).reverse().toString());
    }

    public static BigInteger reverseAndAdd(BigInteger num) {
        String reversed = new StringBuilder(num.toString()).reverse().toString();
        return num.add(new BigInteger(reversed));
    }

    public static boolean isLychrel(int num) {
        BigInteger current = BigInteger.valueOf(num);
        for (int i = 0; i < 500; i++) {
            current = reverseAndAdd(current);
            if (isPalindrome(current)) {
                return false; // Not a Lychrel number
            }
        }
        return true; // Likely a Lychrel number
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isLychrel(num) ? num + " is likely a Lychrel Number" : num + "
is not a Lychrel Number");
    }
}
```

---

⑦ Narcissistic Decimal Number

A **Narcissistic Number** (or Pluperfect Number) is another term for Armstrong number, where the number equals the sum of its digits raised to the power of the number of digits.

Example:

$153 = 1^3 + 5^3 + 3^3 = 153$ (same as Armstrong)

(Use the **Armstrong Number** code above)

---

⑧ Lucas Number

A **Lucas Number** is similar to Fibonacci numbers but starts with 2 and 1.

Lucas Sequence:

2, 1, 3, 4, 7, 11, 18, ...

Java Code:

```java
import java.util.Scanner;

public class LucasNumber {
    public static int lucas(int n) {
        if (n == 0) return 2;
        if (n == 1) return 1;
        return lucas(n - 1) + lucas(n - 2);
    }
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        System.out.println("Lucas Number at position " + n + " is: " + lucas(n));
    }
}
```

---

⑨ Catalan Number

A **Catalan Number** is a sequence of natural numbers that appear in various counting problems, often in combinatorics.

Formula:

$C_n = (2n)! / (n! * (n + 1)!)$

Java Code:

```java
import java.util.Scanner;

public class CatalanNumber {
    public static long factorial(int n) {
        long fact = 1;
        for (int i = 2; i <= n; i++) fact *= i;
        return fact;
    }

    public static long catalan(int n) {
        return factorial(2 * n) / (factorial(n) * factorial(n + 1));
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        System.out.println("Catalan Number at position " + n + " is: " + catalan(n));
    }
}
```

---

⑩ Duck Number

A **Duck Number** is a number that has zeroes in it but does not start with zero.

Example:

0123 is not a Duck Number, but 1230 is.

Java Code:

```java
import java.util.Scanner;

public class DuckNumber {
    public static boolean isDuck(int num) {
        String str = String.valueOf(num);
        return str.charAt(0) != '0' && str.contains("0");
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isDuck(num) ? num + " is a Duck Number" : num + " is not a Duck
Number");
    }
}
```

---

①① Ugly Number

An **Ugly Number** is a number whose prime factors are only 2, 3, or 5.
Example:
6 = 2 × 3 (Ugly Number)
Java Code:

java

```
import java.util.Scanner;

public class UglyNumber {
    public static boolean isUgly(int num) {
        if (num <= 0) return false;
        int[] primes = {2, 3, 5};
        for (int p : primes) {
            while (num % p == 0) num /= p;
        }
        return num == 1;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isUgly(num) ? num + " is an Ugly Number" : num + " is not an
Ugly Number");
    }
}
```

---

①② Abundant Number

An **Abundant Number** is a number where the sum of its proper divisors is greater than the number itself.
Example:
12 → 1 + 2 + 3 + 4 + 6 = 16 > 12
Java Code:

java

```
import java.util.Scanner;

public class AbundantNumber {
    public static boolean isAbundant(int num) {
        int sum = 0;
        for (int i = 1; i <= num / 2; i++) {
            if (num % i == 0) sum += i;
        }
        return sum > num;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isAbundant(num) ? num + " is an Abundant Number" : num + " is
not an Abundant Number");
    }
}
```

---

①③ Deficient Number

A **Deficient Number** is a number where the sum of its proper divisors is less than the number itself.
Example:
8 → 1 + 2 + 4 = 7 < 8
Java Code:

```java
import java.util.Scanner;

public class DeficientNumber {
    public static boolean isDeficient(int num) {
        int sum = 0;
        for (int i = 1; i <= num / 2; i++) {
            if (num % i == 0) sum += i;
        }
        return sum < num;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isDeficient(num) ? num + " is a Deficient Number" : num + " is
not a Deficient Number");
    }
}
```

Let me know if you'd like the remaining number types!

You said:

give remaining

ChatGPT said:

Here are the remaining number types with explanations and Java code:

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①④ Automorphic Number

An **Automorphic Number** is a number whose square ends with the same digits as the number itself.

Example:
$5^2 = 25$, and $76^2 = 5776$
Java Code:

```java
import java.util.Scanner;

public class AutomorphicNumber {
    public static boolean isAutomorphic(int num) {
        int square = num * num;
        return String.valueOf(square).endsWith(String.valueOf(num));
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isAutomorphic(num) ? num + " is an Automorphic Number" : num + " is not an Automorphic Number");
    }
}
```

---

①⑤ Magic Number

A **Magic Number** is a number that eventually becomes 1 when repeatedly summing the digits until a single digit is obtained.
Example:
1729 → 1 + 7 + 2 + 9 = 19 → 1 + 9 = 10 → 1 + 0 = 1 (Magic Number)
Java Code:

```java
import java.util.Scanner;

public class MagicNumber {
    public static boolean isMagic(int num) {
        while (num >= 10) {
            int sum = 0;
            while (num > 0) {
                sum += num % 10;
                num /= 10;
            }
            num = sum;
        }
        return num == 1;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isMagic(num) ? num + " is a Magic Number" : num + " is not a Magic Number");
    }
}
```

---

①⑥ Friendly Pair Numbers

A **Friendly Pair** is a pair of numbers whose sum of divisors divided by the number itself gives the same result for both numbers.
Example:
220 and 284 are friendly pairs.
Java Code:

```java
import java.util.Scanner;

public class FriendlyPairNumbers {
    public static int sumOfDivisors(int num) {
        int sum = 0;
        for (int i = 1; i <= num / 2; i++) {
            if (num % i == 0) sum += i;
        }
        return sum;
    }

    public static boolean areFriendlyPairs(int num1, int num2) {
        return (double) sumOfDivisors(num1) / num1 == (double) sumOfDivisors(num2) / num2;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num1 = sc.nextInt();
        int num2 = sc.nextInt();
        System.out.println(areFriendlyPairs(num1, num2) ? num1 + " and " + num2 + " are
Friendly Pairs" : "They are not Friendly Pairs");
    }
}
```

---

①⑦ Neon Number

A **Neon Number** is a number where the sum of the digits of its square is equal to the number itself.
Example:
9 → 9^2 = 81 → 8 + 1 = 9
Java Code:

```java
import java.util.Scanner;

public class NeonNumber {
    public static boolean isNeon(int num) {
        int square = num * num;
        int sum = 0;
        while (square > 0) {
            sum += square % 10;
            square /= 10;
        }
        return sum == num;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isNeon(num) ? num + " is a Neon Number" : num + " is not a Neon
Number");
```

```
        }
    }
```

---

⑱ Spy Number

A **Spy Number** is a number where the sum of its digits equals the product of its digits.
Example:
112 → 1 + 1 + 2 = 4, and 1 × 1 × 2 = 4
Java Code:

```java
import java.util.Scanner;

public class SpyNumber {
    public static boolean isSpy(int num) {
        int sum = 0, product = 1;
        while (num > 0) {
            int digit = num % 10;
            sum += digit;
            product *= digit;
            num /= 10;
        }
        return sum == product;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isSpy(num) ? num + " is a Spy Number" : num + " is not a Spy
Number");
    }
}
```

---

⑲ Happy Number

A **Happy Number** is a number that leads to 1 after a sequence of steps wherein each step replaces the number with the sum of the squares of its digits.
Example:
19 → $1^2 + 9^2 = 82$ → $8^2 + 2^2 = 68$ → ... → 1 (Happy Number)
Java Code:

```java
import java.util.HashSet;
import java.util.Scanner;

public class HappyNumber {
    public static boolean isHappy(int num) {
        HashSet<Integer> seen = new HashSet<>();
        while (num != 1 && !seen.contains(num)) {
            seen.add(num);
            int sum = 0;
            while (num > 0) {
                int digit = num % 10;
                sum += digit * digit;
                num /= 10;
            }
            num = sum;
        }
        return num == 1;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isHappy(num) ? num + " is a Happy Number" : num + " is not a
Happy Number");
    }
}
```

---

20. Sunny Number

A **Sunny Number** is a number where the number + 1 is a perfect square.
Example:
24 → 24 + 1 = 25, which is a perfect square.
Java Code:

```java
import java.util.Scanner;

public class SunnyNumber {
    public static boolean isSunny(int num) {
        return Math.sqrt(num + 1) % 1 == 0;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isSunny(num) ? num + " is a Sunny Number" : num + " is not a
Sunny Number");
    }
}
```

---

②① Disarium Number

A **Disarium Number** is a number where the sum of its digits, each raised to the power of their respective positions, equals the number itself.
Example:
135 → $1^1 + 3^2 + 5^3$ = 135
Java Code:

```java
import java.util.Scanner;

public class DisariumNumber {
    public static boolean isDisarium(int num) {
        String str = String.valueOf(num);
        int sum = 0;
        for (int i = 0; i < str.length(); i++) {
            int digit = Character.getNumericValue(str.charAt(i));
            sum += Math.pow(digit, i + 1);
        }
        return sum == num;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isDisarium(num) ? num + " is a Disarium Number" : num + " is
not a Disarium Number");
    }
}
```

---

②② Pronic Number

A **Pronic Number** is a number that is the product of two consecutive integers.
Example:
12 = 3 × 4
Java Code:

```java
import java.util.Scanner;

public class PronicNumber {
    public static boolean isPronic(int num) {
        for (int i = 0; i < num; i++) {
            if (i * (i + 1) == num) {
                return true;
            }
        }
        return false;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isPronic(num) ? num + " is a Pronic Number" : num + " is not a
Pronic Number");
    }
}
```

---

②③ Trimorphic Number

A **Trimorphic Number** is a number whose cube ends with the number itself.
Example:
4^3 = 64, and 24^3 = 13824 (both end with 4 and 24)
Java Code:

```java
import java.util.Scanner;

public class TrimorphicNumber {
    public static boolean isTrimorphic(int num) {
        int cube = num * num * num;
        return String.valueOf(cube).endsWith(String.valueOf(num));
    }
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isTrimorphic(num) ? num + " is a Trimorphic Number" : num + "
is not a Trimorphic Number");
    }
}
```

---

②④ Evil Number

An **Evil Number** is a non-negative integer that has an even number of 1s in its binary representation.
Example:
9 → Binary: 1001 (Two 1s)
Java Code:

```java
import java.util.Scanner;

public class EvilNumber {
    public static boolean isEvil(int num) {
        int count = Integer.bitCount(num); // counts 1s in binary
        return count % 2 == 0;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num = sc.nextInt();
        System.out.println(isEvil(num) ? num + " is an Evil Number" : num + " is not an
Evil Number");
    }
}
```

---

②⑤ Amicable Pairs

Amicable Pairs are two numbers where the sum of the divisors of one number equals the other number, and vice versa.
Example:
220 and 284 are Amicable Pairs.
Java Code:

```java
import java.util.Scanner;

public class AmicablePairs {
    public static int sumOfDivisors(int num) {
        int sum = 0;
        for (int i = 1; i <= num / 2; i++) {
            if (num % i == 0) sum += i;
        }
        return sum;
    }

    public static boolean areAmicable(int num1, int num2) {
        return sumOfDivisors(num1) == num2 && sumOfDivisors(num2) == num1;
    }
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int num1 = sc.nextInt();
        int num2 = sc.nextInt();
        System.out.println(areAmicable(num1, num2) ? num1 + " and " + num2 + " are
Amicable Pairs" : "They are not Amicable Pairs");
    }
}
```

This concludes all the requested number types with examples and Java code. Let me know if you need further assistance!

ChatGPT can make mistakes. Check important info.