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Practice Problems:

1. Prime numbers in a given range

```
import java.util.Scanner;

public class PrimeInRange {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int l = sc.nextInt();
        int r = sc.nextInt();
        for (int i = l; i <= r; i++) {
            if (isPrime(i)) System.out.print(i + " ");
        }
    }

    static boolean isPrime(int n) {
        if (n <= 1) return false;
        for (int i = 2; i * i <= n; i++) {
            if (n % i == 0) return false;
        }
        return true;
    }
}
```

2. Armstrong numbers between two intervals

```
import java.util.Scanner;

public class ArmstrongInRange {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int l = sc.nextInt();
        int r = sc.nextInt();
        for (int i = l; i <= r; i++) {
            if (isArmstrong(i)) System.out.print(i + " ");
        }
    }

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

3. Can a number be expressed as a sum of two prime numbers?

```
import java.util.Scanner;

public class SumOfTwoPrimes {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      int n = sc.nextInt();
      boolean found = false;
      for (int i = 2; i <= n / 2; i++) {
         if (isPrime(i) && isPrime(n - i)) {
            System.out.println(i + " " + (n - i));
            found = true;
            break;
         }
      }
      if (!found) System.out.println("No");
   }

   static boolean isPrime(int n) {
      if (n <= 1) return false;
      for (int i = 2; i * i <= n; i++) {
         if (n % i == 0) return false;
      }
      return true;
   }
}
```

4. Replace all 0's with 1 in a given integer

```
import java.util.Scanner;

public class ReplaceZeroWithOne {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      int n = sc.nextInt();
      System.out.println(String.valueOf(n).replace('0', '1'));
   }
}
```

5. Binary to decimal conversion

```
import java.util.Scanner;

public class BinaryToDecimal {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      String binary = sc.next();
      System.out.println(Integer.parseInt(binary, 2));
   }
```

```
}
```

6. Decimal to binary conversion

```
import java.util.Scanner;

public class DecimalToBinary {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      int n = sc.nextInt();
      System.out.println(Integer.toBinaryString(n));
   }
}
```

7. Decimal to octal conversion

```
import java.util.Scanner;

public class DecimalToOctal {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      int n = sc.nextInt();
      System.out.println(Integer.toOctalString(n));
   }
}
```

8. Octal to decimal conversion

```
import java.util.Scanner;

public class OctalToDecimal {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      String octal = sc.next();
      System.out.println(Integer.parseInt(octal, 8));
   }
}
```

9. Binary to octal conversion

```
import java.util.Scanner;

public class BinaryToOctal {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      String binary = sc.next();
```

```
        int decimal = Integer.parseInt(binary, 2);
        System.out.println(Integer.toOctalString(decimal));
    }
}
```

10. Octal to binary conversion

```
import java.util.Scanner;

public class OctalToBinary {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        String octal = sc.next();
        int decimal = Integer.parseInt(octal, 8);
        System.out.println(Integer.toBinaryString(decimal));
    }
}
```

11. Maximum number of handshakes

```
import java.util.Scanner;

public class MaxHandshakes {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        System.out.println(n * (n - 1) / 2);
    }
}
```

12. Quadrants in which coordinates lie

```
import java.util.Scanner;

public class Quadrant {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int x = sc.nextInt();
        int y = sc.nextInt();
        if (x > 0 && y > 0) System.out.println("1");
        else if (x < 0 && y > 0) System.out.println("2");
        else if (x < 0 && y < 0) System.out.println("3");
        else if (x > 0 && y < 0) System.out.println("4");
        else System.out.println("Axis");
    }
}
```

13. Convert digit/number to words

```
import java.util.Scanner;

public class NumberToWords {
   static String[] words = {"Zero", "One", "Two", "Three", "Four", "Five", "Six", "Seven", "Eight",
"Nine"};

   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      int n = sc.nextInt();
      for (char c : String.valueOf(n).toCharArray()) {
         System.out.print(words[c - '0'] + " ");
      }
   }
}
```

14. Number of days in a given month of a given year

```
import java.util.Scanner;

public class DaysInMonth {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      int month = sc.nextInt();
      int year = sc.nextInt();
      int days;
      if (month == 2) days = (year % 4 == 0 && (year % 100 != 0 || year % 400 == 0)) ? 29 : 28;
      else if (month == 4 || month == 6 || month == 9 || month == 11) days = 30;
      else days = 31;
      System.out.println(days);
   }
}
```

15. Permutations in which n people can occupy r seats in a theatre

```
import java.util.Scanner;

public class Permutations {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      int n = sc.nextInt();
      int r = sc.nextInt();
      System.out.println(factorial(n) / factorial(n - r));
   }
```

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

16. Number of times digit 3 occurs in each and every number from 0 to n

```
import java.util.Scanner;

public class CountDigitThree {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int count = 0;
        for (int i = 0; i <= n; i++) {
            count += countThrees(i);
        }
        System.out.println(count);
    }

    static int countThrees(int n) {
        int count = 0;
        while (n > 0) {
            if (n % 10 == 3) count++;
            n /= 10;
        }
        return count;
    }
}
```

17. Number of integers which have exactly 9 divisors

```
import java.util.Scanner;

public class NumbersWithNineDivisors {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        int count = 0;
        for (int i = 1; i <= n; i++) {
            if (countDivisors(i) == 9) count++;
        }
        System.out.println(count);
    }

    static int countDivisors(int n) {
        int count = 0;
        for (int i = 1; i * i <= n; i++) {
```

```
            if (n % i == 0) {
                count++;
                if (i != n / i) count++;
            }
        }
        return count;
    }
}
```

18. Roots of a quadratic equation

```
import java.util.Scanner;

public class QuadraticRoots {
    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 = b * b - 4 * a * c;
        if (d < 0) System.out.println("Imaginary");
        else {
            double root1 = (-b + Math.sqrt(d)) / (2.0 * a);
            double root2 = (-b - Math.sqrt(d)) / (2.0 * a);
            System.out.println(root1 + " " + root2);
        }
    }
}
```

19. Count possible decodings of a given digit sequence

```
import java.util.Scanner;

public class CountDecodings {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        String s = sc.next();
        System.out.println(countDecodings(s));
    }

    static int countDecodings(String s) {
        int n = s.length();
        if (n == 0 || s.charAt(0) == '0') return 0;
        int[] dp = new int[n + 1];
        dp[0] = dp[1] = 1;
        for (int i = 2; i <= n; i++) {
            if (s.charAt(i - 1) != '0') dp[i] += dp[i - 1];
            int twoDigit = Integer.parseInt(s.substring(i - 2, i));
```

```
            if (twoDigit >= 10 && twoDigit <= 26) dp[i] += dp[i - 2];
        }
        return dp[n];
    }
}
```