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Q1. write a java program that takes the value of N through keyboard and prints a table of the powers of 2 that are less than or equal to 2^N .

Ans.

```

import java.util.*;
public class A5G1
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int n, i;
        System.out.println("Enter the value of n:");
        n = sc.nextInt();
        for (i = 0; i < n; i++)
        {
            double x = Math.pow(2, i);
            System.out.println("2^" + i + " = " + x);
        }
    }
}

```

Q2. Given a set of n numbers. write a java program that to count the number of students that passed the examination .A pass is awarded for all marks of 40 and above.

Ans.

```

import java.util.*;
public class A5G2
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int i, n, c = 0;

```

```

        n = sc.nextInt();
        for (i = 0; i < n; i++)
        {
            int m = sc.nextInt();
            if (m >= 40)
                c++;
        }
        System.out.println("Number of students who passed = " + c);
    }
}

```

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```
System.out.println("Enter the numbers u want to enter");
n = sc.nextInt();
for(i=1; i<=n; i++)
{
    System.out.println("Enter the mark");
    int num = sc.nextInt();
    if(num >= 40)
        C++;
}
System.out.println("The pass students are "+C);
```

Q3. write a java program that displays all the members from 100 to 1000, ten per line, that are divisible by 5 and 6. Numbers are separated by exactly one space.

Ans. Public class A5Q3

```
{ public static void main (String [] args)
{
    int count = 0;
    for (int i=100; i<=1000; i++)
    {
        if (i%5 == 0 && i%6 == 0)
            count++;
        if (count%11 == 0)
            System.out.println();
        else
            System.out.print (i + " ");
    }
}}
```

Q4. write a java program that reads an unspecified number of integers, determines how many positive and negative values have been read, and computes the total and average of the input values (not counting zeros). Your program ends with the input 0. Display the average as a floating-point number.

```

Ans. import java.util.*;
public class ASQ4
{
    public static void main(String []args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number (input ends
                           if it is 0)");
        int n = sc.nextInt();
        int sum = 0, c = 0, pos = 0, neg = 0;
        if (n == 0)
        {
            System.out.println("No number are entered
                               except 0");
        }
        else
        {
            while (n != 0)
            {
                c++;
                sum = sum + n;
                if (n > 0)
                    pos++;
                else neg++;
                System.out.println("Enter the number (input ends
                                   if it is 0)");
            }
        }
    }
}
  
```

```
n = sc.nextInt();  
}  
double avg = sum/c;  
System.out.println("The number of positives is "+pos);  
System.out.println("The number of negatives is "+neg);  
System.out.println("The total is "+sum);  
System.out.println("The average is "+avg);  
}  
}
```

Q5. Given a set of n numbers. write a java program that adds these numbers and returns the resultant sum and compute the average. Assume n is greater than or equal to zero.

```
Ans. import java.util.*;
public class ASQ5
{
    public static void main(String []args)
    {
        Scanner sc = new Scanner (System.in);
        System.out.println ("Enter how many numbers you want
                            to enter");
        int n = sc.nextInt();
        int sum = 0, m;
        for (int i = 0; i <= n; i++)
        {
            System.out.println ("Enter how many numbers
                                you want to enter");
            m = sc.nextInt();
            sum = sum + m;
        }
    }
}
```

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```
{  
    double avg = sum / n;  
    System.out.println("The total is " + sum);  
    System.out.println("The average is " + avg);  
}  
}
```

Q6. write a java program to Compute the harmonic mean.

Ans. import java.util.*;

public class A5Q6

```
{  
    public static void main(String[] args)  
    {  
        Scanner sc = new Scanner (System.in);  
        int n, a;  
        double s = 0, H = 0;  
        System.out.println("Enter the value of n");  
        n = sc.nextInt();  
        for (int i=1; i <= n; i++)  
        {  
            System.out.println("Enter the value of a[" + i + "]");  
            a = sc.nextInt();  
            s += (1/a);  
        }  
        H = n/s;  
        System.out.println("The harmonic mean is = " + H);  
    }  
}
```

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Q7. Create a java program to compute the sum of the first n terms ($n \geq 1$) of the series $S = 1 - 3 + 5 - 7 + 9 - \dots$

Ans. import java.util.*;

public class A5Q7

{

 public static void main (String [] args)

{

 Scanner sc = new Scanner (System.in);
 int i, signs = 1, term = 0, sum = 0, m = 1;
 System.out.println ("Enter the range");

 int n = sc.nextInt();

 for (i = 1; i <= n; i++)

{

 term = 1;

 term = signs * m;

 sum += term;

 m += 2;

 signs *= -1;

}

 System.out.println ("The sum is = " + sum);

}

}

Q8. Input a number n , write a java program to compute n factorial where $n \geq 0$.

Ans. import java.util.*;

public class A5Q8

{

 public static void main (String [] args)

{

```
Ques 10. Write a Java program which  
will calculate fact = 1;  
System.out.println("Enter the no whose factorial  
n = sc.nextInt());  
for (int i = 1; i <= n; i++)  
{  
    fact *= i;  
}  
System.out.println("Factorial of " + n + " is -  
" + fact);  
}
```

Ques. For a given x and a given n , write a Java program
to compute $x^n/n!$.

```
Ans import java.util.*;  
public class NSQ9  
{  
    public static void main (String [] args)  
{  
        Scanner sc = new Scanner (System.in);  
        int x,n,fact=1;  
        System.out.println("Enter the value of x");  
        x = sc.nextInt();  
        System.out.println("Enter the value of n");  
        n = sc.nextInt();  
        for (int i = 1; i <= n; i++)  
            fact *= i;  
        }
```

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```

    }
    double term = ((Math.pow(x, n)) / n);
    System.out.println(term);
}
}

```

Q10. write a java program to evaluate the function $\sin(x)$ as defined by the infinite series $\sin(x) = x - x^3/3! + x^5/5! - x^7/7! + \dots$. The acceptable error for computation is 10^{-6} .

```

Ans. import java.util.Scanner;
public class A5Q10
{
    public static void main(String []args)
    {
        Scanner sc = new Scanner(System.in);
        double x;
        System.out.println("Enter the value of x in radians");
        x = sc.nextDouble();
        double tsin = x;
        double term = x;
        double error = 0.000001;
        int i = 1;
        while (Math.abs(term) > error)
        {
            i += 2;
            term = -term * (x * x) / (i * (i - 1));
            tsin += term;
        }
    }
}

```

System.out.println("The value of $\sin(e + x + \pi) = ?$ + tsin")

Q11. write a java program to evaluate the function $\cos(x)$ as defined by the infinite series expansion. $\cos(x) = 1 - x^2/2! + x^4/4! - x^6/6! + \dots$. The acceptable error for computation is 10^{-6} .

Ans. import java.util.*;

public class A5Q11

{

public static void main(String[] args)

{

Scanner sc = new Scanner(System.in);

System.out.println("Enter the value of x
in radians");

double x = sc.nextDouble();

double error = 0.000001;

double tcos = 1;

double term = 1;

int i = 0;

while (Math.abs(term) > error)

{

i += 2;

term = -term * (x * x) / (i * (i - 1));

tcos += term;

}

System.out.println("Cos(" + x + ") = " + tcos);

}

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Q12. Assume that x is a positive variable of type double. write a code fragment that use the Taylor series expansion expansion to set the value of e^x sum to

$$e^x = 1 + x + x^2/2! + x^3/3! + \dots$$

Ans. import java.util.*;

public class ASG12

{

 public static void main(String [] args)

{

 Scanner sc = new Scanner(System.in);

 System.out.println("enter the value of x in radians");

 double x = sc.nextDouble();

 double sum = 0.0;

 double term = 1.0;

 for (int i = 1; sum != sum + term; i++)

{

 sum = sum + term;

 term = term * x / i;

{

 System.out.println("e^(" + x + ") = " + sum);

{

{

Q13. write a java program to generate and print the first n terms of the Fibonacci sequence where $n >= 1$. The first few terms are : 0, 1, 1, 2, 3, 5, 8, 13..

If $n = 2$, it will display as : Fibonacci Series is
: 0, 1 :

If $n = 3$, it will display as : Fibonacci Series is

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if n = 10, it will display as : Fibonacci Series as : 0, 1, 1, 2, 3, 5, 8, 13, 21, 34.

```

Ans. import java.util.*;
public class A5G13
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int n, t1 = 0, t2 = 1;
        System.out.println("Enter number of terms");
        n = sc.nextInt();
        System.out.println("Fibonacci Series");
        for (int i = 1; i <= n; ++i)
        {
            System.out.print(t1 + " ");
            int sum = t1 + t2;
            t1 = t2;
            t2 = sum;
        }
    }
}

```

Q14. write a java program to generate and print the first n terms of the Fibonacci numbers using an efficient algorithm.

```

Ans. import java.util.Scanner;
public class A5 G14
{
    public static void main(String args[])
    {
    }
}

```

{

```
Scanner sc = new Scanner(System.in);
```

```
int a = 0;
```

```
int b = 1;
```

```
int c = 2;
```

```
System.out.println("Enter the range");
```

```
int n = sc.nextInt();
```

```
while(n > i)
```

{

```
System.out.println(a + "\n" + b);
```

```
a = a + b;
```

```
b = a + b;
```

```
c += 2;
```

{

```
if(c % n == 0)
```

```
    System.out.println(a + "\n" + b);
```

```
else
```

```
    System.out.println(a)
```

{

{

Q15. Suppose you save \$100 each month into a savings account with the annual interest rate 5%. So, the Monthly interest rate is $0.05/12 = 0.00417$.

After the first month, the value in the account becomes

$$100 * (1 + 0.00417) = 100.417$$

After the second month, the value in the account becomes

$$(100 + 100.417) * (1 + 0.00417) = 201.252$$

After the third month, the value in the account becomes

$$(100 + 201.252) * (1 + 0.00417) = 302.507$$

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and so on.

write a java program that prompts the user to enter an amount (eg, 100), the annual interest rate, and the number of months and displays the amount in the savings account after the given month.

Ans. import java.util.Scanner;

public class ASQ15

{ public static void main (String [] args)

{ Scanner input = new Scanner (System.in);

System.out.print ("Enter an amount (eg.100):");

double amount = input.nextDouble();

System.out.print ("Enter the annual interest
rate (eg. 5):");

double annualInterestRate = input.nextDouble();

System.out.print ("Enter the number of months
(e.g, 6):");

int months = input.nextInt();

double monthlyInterestRate = annualInterestRate / 1200;

double CompoundValue = 0; // Accumulates compound value

for (int m = 1; m <= months; m++)

{

CompoundValue = (amount + CompoundValue) * (1 +
monthlyInterestRate);

}

System.out.println ("Amount in savings account
after "+months+" months "+
"compound value");

}

}

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Q16. write a java program that accept a positive integer, n and reverse the order of its digits.

Ans. import java.util.Scanner;
public class A5 Q16
{
 public static void main (String [] args)
 {
 Scanner sc = new Scanner (System.in);
 System.out.println ("Enter a number");
 int n = sc.nextInt();
 int decr = 0;
 while (n > 0)
 {
 int rem = n % 10;
 decr = (decr * 10) + rem;
 n /= 10;
 }
 System.out.println ("Reverse is " + decr);
 }
}

Q17. write a java program to compute the square root of a number using Newton's method.

Ans. import java.util.*;
public class A5 Q17
{
 public static void main (String [] args)
 {
 Scanner sc = new Scanner (System.in);
 System.out.println ("Enter the number whose square root is to be found");
 int n = sc.nextInt();

```

double g1, g2;
g2 = n/2;
do
{
    g1 = g2;
    g2 = (g1 + (n/g1)) / 2.0;
} while (Math.abs(g1 - g2) > 0.000001);
double root = g2;
System.out.println("The root of " + n + " is = " + root);
}
    
```

Q18. Using Newton's method, write a java program that takes integers N and k as Command line arguments and prints the k th root of N.

```

Ans. import java.util.*;
public class A5 Q18
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number to find
                           the given root");
        int n = sc.nextInt();
        System.out.println("Enter the root");
        int k = sc.nextInt();
        double g1, g2;
        g2 = n/2;
        do
    }
    
```

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```

g1 = g2;
g2 = ((K-1)*g1 + n/Math.pow(g1, K-1))/K;
} while(Math.abs(g1 - g2) > 0.000001);
System.out.println("The square root of " + n + " is = "
+ g2);
}
    
```

Q19. write a java program that prints the binary representation of a positive integer N into a string s.

Ans. import java.util.*;
 public class A5 Q19

```

{
    public static void main( String [ ] args )
    {
        Scanner sc = new Scanner( System . in );
        System.out.println("Enter a number");
        int n = sc.nextInt();
        String str = " ";
        while (n > 0)
        {
            int rem = n % 2;
            str = rem + str;
            n = n / 2;
        }
        System.out.println(str);
    }
}
    
```

Q20. write a Java program that reads an integer and displays all its smallest factors in increasing order.
 For example: if the integer is 120, the output should be 2, 2, 2, 3, 5.

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Ans.

```

import java.util.Scanner;
public class A5Q20
{
    public static void main (String [] args)
    {
        Scanner input = new Scanner (System.in);
        System.out.print ("Enter an integer: ");
        int number = input.nextInt ();
        int index = 2;
        while (number / index != 1)
        {
            if (number % index == 0)
            {
                System.out.print (index + ", ");
                number /= index;
            }
            else
                index++;
        }
        System.out.println (number + ".");
    }
}

```

Q21. write a Java program GCD that finds the greatest common divisor of two integers using Euclid's algorithm, which is an iterative computation based on the following observation: if x is greater than y then if y divides x , the gcd of x and y is y ; otherwise

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the gcd of x and y is the same as the gcd of $x \% y$ & y.

Ans. import ~~java.util~~ java.util*;
public class ASQ21

{ public static void main (String [] args)
{

Scanner sc = new Scanner (System .in);

System.out.println ("Enter a number");

int x = sc.nextInt();

System.out.println ("Enter the second number");

int y = sc.nextInt();

while (y > 0)

{

int rem = x % y;

x = y;

y = rem;

}

System.out.println ("GCD = " + x);

}

}

Q22. write a java program to check a number n is prime or not. The number to be inputed through keyboard.



```
Ans. import java.util.*;
public class A5Q22
{
    public static void main(String [] args)
    {
        Scanner sc = new Scanner (System.in);
        System.out.println("Enter a number");
        int n = sc.nextInt();
        int flag = 0;
        for(int i= 2; i<n; i++)
        {
            if(n % i == 0)
            {
                flag = 1;
                break;
            }
        }
        if(flag == 0)
            System.out.println(n + " is prime");
        else
            System.out.println(n + " is not prime");
    }
}
```

Q23. write a java program called Prime Counter that takes a Commandline argument N and finds the number of primes less than or equal to N.

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```
Ans public class Q23  
{ public static void main (String [] args)  
{  
    System.out.println ("Enter the range");  
    int n = Integer.parseInt (args[0]);  
    int flag;  
    for (int i = 2; i < n; i++)  
    {  
        iflag = 0;  
        for (int j = 2; j <= i; j++)  
        {  
            if (i % j == 0)  
                iflag++;  
        }  
        if (iflag == 1)  
            System.out.println (i + " is prime");  
        else  
            System.out.println (i + " is not prime");  
    }  
}
```

Q24 write a java program that takes a command-line argument N and prints out all integers less than or equal to N that can be expressed as the sum of two cubes in two different ways. In other words

Find distinct positive integers a, b, c and d such that $a^3 + b^3 = c^3 + d^3$. Use four nested for loops.

Ans. public class ASG24

```

  {
    public static void main(String [] args)
    {
      int n = Integer.parseInt(args[0]);
      for (int a = 1; a <= n; a++)
      {
        int a3 = a * a * a;
        if (a3 > n) break;
        for (int b = a; b <= n; b++)
        {
          int b3 = b * b * b;
          if (a3 + b3 > n) break;
          for (int c = a + 1; c <= n; c++)
          {
            int c3 = c * c * c;
            if (c3 > a3 + b3) break;
            for (int d = c; d <= n; d++)
            {
              int d3 = d * d * d;
              if (c3 + d3 > a3 + b3) break;
              if (c3 + d3 == a3 + b3)
                System.out.println((a3 + b3) + " = " + (c3 + d3));
            }
          }
        }
      }
    }
  }
}
  
```

```
System.out.print(a + "AB" + "CD" + "EF");
System.out.print(C + "AB" + "CD" + "EF");
System.out.println();
}
}
}
}
```