

Solution of Assignment 3

Question 1.

```
import java.util.*;
public class Q1
{
    public void input()
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter your lucky number:");
        int no = sc.nextInt();
        if(no<0)
            throw new NumberFormatException("Negative number");
        else
            System.out.println("Your lucky number is "+no);
    }
    public static void main(String[] args)
    {
        Q1 q = new Q1();
        try
        {
            q.input();
        }
        catch(NumberFormatException e)
        {
            System.out.println(e);
        }
    }
}
```

Question 2.

```
import java.util.*;
public class Q2
{
    String[] arr;
    public Q2()
```

```

{
    arr = new String[4];
}
void input()
{
    Scanner sc = new Scanner(System.in);
    System.out.println("Enter 4 colors");
    for(int i = 0;i<arr.length;i++)
    {
        arr[i] = sc.next();
    }
}
void str_To_int()
{
    throw new NumberFormatException("For input string: \""+arr[0]+"\"");
}
void add_color(String color)throws ArrayIndexOutOfBoundsException
{
    arr[arr.length+1]= color;
}
void display()
{
    System.out.println("The colors entered are");
    for(int i = 0;i<arr.length;i++)
    {
        System.out.println(arr[i]);
    }
}
public static void main(String[] args)
{
    Q2 q = new Q2();
    q.input();
    try
    {
        q.str_To_int();
    }
    catch(Exception e)
    {
        System.out.println(e);
    }
}

```

```

        try
        {
            Scanner sc = new Scanner(System.in);
            System.out.println("Enter one more color: ");
            String color = sc.next();
            q.add_color(color);
        }
        catch(Exception e)
        {
            System.out.println(e);
        }
        finally
        {
            q.display();
        }
    }
}

```

Question 3.

```

import java.util.Scanner;
class MarksOutOfBoundException extends Exception
{
    public MarksOutOfBoundException(String str)
    {
        System.out.println(str);
    }
}
class Student
{
    public String name;
    public double marks;
    public Student(String n,double m)
    {
        this.name = n;
        this.marks = m;
    }
}

```

```

    public void display() throws Exception
    {
        if(this.marks>=0 && this.marks<=100)
        {
            System.out.println(this.name +" has got "+this.marks);
        }
        else
        {
            throw new MarksOutOfBoundException("Mark can't be greater than
100");
        }
    }
}
public class Q3
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the name of the student: ");
        String n = sc.next();
        System.out.println("Enter marks: ");
        double m = sc.nextDouble();
        Student s = new Student(n,m);
        try
        {
            s.display();
        }
        catch(Exception e)
        {
            System.out.println(e);
        }
    }
}

```

Question 4.

```

import java.util.Scanner;
class Box1<T>
{

```

```

    T item;
    public void setValue(T item)
    {
        this.item = item;
    }
    public T returnValue()
    {
        return this.item;
    }
}
public class Q4
{
    public static void main(String[] args)
    {
        Box1<String> S = new Box1<String>();
        S.setValue("CSE");
        System.out.println(S.returnValue());
        Box1<String> S1 = S;
        Box1<String> S2 = S;
        S1.setValue("CSIT");
        System.out.println(S.returnValue());
        System.out.println(S1.returnValue());
        System.out.println(S2.returnValue());
        //////////// Integer
        Box1<Integer> I = new Box1<Integer>();
        I.setValue(10);
        System.out.println(I.returnValue());
        Box1<Integer> I1 = I;
        Box1<Integer> I2 = I;
        I1.setValue(20);
        System.out.println(I.returnValue());
        System.out.println(I1.returnValue());
        System.out.println(I2.returnValue());
        //////////// Object type
        Box1<Object> ob = new Box1<Object>();
        ob.setValue("ITER");
        System.out.println(I.returnValue());
        Box1<Object> ob1 = ob;
        Box1<Object> ob2 = ob;
        ob1.setValue(100);
    }
}

```

```

        System.out.println(ob.returnValue());
        System.out.println(ob1.returnValue());
        System.out.println(ob2.returnValue());
    }
}

```

Question 5.

```

public class Q5
{
    public static <T>void printArray(T[] arr)
    {
        for(int i = 0; i<arr.length;i++)
            System.out.print(arr[i]+" ");
    }
    public static void main(String[] args)
    {
        // TODO Auto-generated method stub
        Integer[] a = {10,20,30,40,50};
        System.out.println("Integer array elements are: ");
        printArray(a);
        String[] b = {"IGT","DSA","UPM","Calculus"};
        System.out.println("\nString array elements are: ");
        printArray(b);
    }
}

```

Question 6.

```

public class Q6
{
    public <T>int count(T[] arr, T item)
    {
        int c = 0;
        for(int i = 0;i<arr.length;i++)
        {
            if(arr[i]==item)
                c++;
        }
    }
}

```

```

    }

    return c;
}

public static void main(String[] args) {
    Q5 o = new Q5();
    Integer[] a = {10,20,30,40,50,20,10,20};
    System.out.println("Occurrence of search elements: "+o.count(a,20));
    String[] b = {"IGT","DSA","UPM","Calculus","DSA"};
    System.out.println("\nString array elements are: " +o.count(b,"DSA"));
}
}

```

Question 7.

```

public class Q7
{
    public static long fact(int n)
    {
        if(n==1 || n==0)
            return 1;
        else
            return n*fact(n-1);
    }
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter a no.: ");
        int n = sc.nextInt();
        System.out.println("Factorial value: "+fact(n));
    }
}

```

Question 8.

```

import java.util.Scanner;

```

```

public class Q8
{
    public static int pow(int base, int power)
    {
        if(base == 0)
            return 0;
        else if(power == 0)
            return 1;
        else
            return base*pow(base,power-1);
    }
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the base: ");
        int base = sc.nextInt();
        System.out.println("Enter the power: ");
        int power = sc.nextInt();
        System.out.println(base+" power of "+power+" is "+pow(base, power));
    }
}

```

Question 9.

```

import java.util.Scanner;

class Q9
{
    public static int reverse(int n,int sum)
    {
        if(n==0)
            return sum;
        else
        {
            sum = sum*10 + n%10;
            return reverse(n/10, sum);
        }
    }
    public static void main(String[] args)

```



```

    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number: ");
        int n = sc.nextInt();
        System.out.print("Reverse number is: "+reverse(n,0));
    }
}

```

Alternative solution using string

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

```

class Q9
{
    public static String reverse(int n)
    {
        if(n==0)
            return "";
        else
            return n%10+reverse(n/10);
    }
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number: ");
        int n = sc.nextInt();
        System.out.print("Reverse number is: "+reverse(n));
    }
}

```

Question 10.

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

```

class Q10
{
    public static int fibonacci(int n)
    {

```

```

        if(n==0 || n == 1)
            return n;
        else
            return fibonacci(n-1) + fibonacci(n-2);
    }
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the number of terms of fibonacci series: ");
        int n = sc.nextInt();
        for(int i = 0; i < n; i++)
            System.out.print(fibonacci(i) + "\t");
    }
}

```

Home assignment

Question 1.

```

import java.util.Scanner;

class HQ1
{
    public static int gcd(int n, int m)
    {
        if(m == 0)
            return n;
        else
            return gcd(m, n%m);
    }
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the first number: ");
        int n = sc.nextInt();
        System.out.println("Enter the second number: ");
        int m = sc.nextInt();
        System.out.print("GCD between "+n+" and "+m+" is "+gcd(n,m));
    }
}

```

```
    }  
}
```

Question 2.

```
import java.util.Scanner;  
class HQ2  
{  
    public static void BinarySearch(int arr[], int item, int start, int end)  
    {  
        int mid = (start+end)/2;  
        if(start>end)  
            System.out.println("Search element not found");  
        else if(arr[mid] == item)  
            System.out.println("Search element found");  
        else if(arr[mid]>item)  
            BinarySearch(arr, item,start, mid-1);  
        else  
            BinarySearch(arr, item, mid+1,end);  
    }  
    public static void main(String[] args)  
    {  
        int arr[] = {10, 20, 21, 30, 30, 56, 89};  
        BinarySearch(arr, 300, 0,arr.length-1);  
    }  
}
```

Question 3.

```
import java.util.Scanner;  
  
class HQ3  
{  
    public static int BtoD(int n,int m)  
    {  
        if(n<2)  
            return n;  
        else
```

```

        return (n%2)+10*DtoB(n/2);
    }
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the first number: ");
        int n = sc.nextInt();
        System.out.println("Enter the second number: ");
        int m = sc.nextInt();
        System.out.print("GCD between "+n+" and "+m+" is "+gcd(n,m));
    }
}

```

Question 4.

```

import java.util.Scanner;

class HQ4
{
    public static int product(int n, int m)
    {
        if(m==1)
            return n;
        else
            return n+product(n, m-1);
    }
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the first number: ");
        int n = sc.nextInt();
        System.out.println("Enter the second number: ");
        int m = sc.nextInt();
        System.out.print("Binary representation is "+product(n,m));
    }
}

```

Question 5.

```
import java.util.Scanner;

class HQ5
{
    public static String reverse(String S, int index)
    {
        if(index<S.length())
            return reverse(S, index+1)+S.charAt(index);
        else
            return "";
    }
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter a string: ");
        String S = sc.nextLine();
        System.out.println("reverse is: "+reverse(S,0));
    }
}
```

Question 6.

```
import java.util.Scanner;

class HQ6
{
    public static String reverse(String S, int index)
    {
        if(index<S.length())
            return reverse(S, index+1)+S.charAt(index);
        else
            return "";
    }
    public static void isPalindrome(String S)
    {
        if(S.equals(reverse(S,0)))
            System.out.println("Palindrome string");
    }
}
```

```

        else
            System.out.println("Not Palindrome string");
    }
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter a string: ");
        String S = sc.nextLine();
        isPalindrome(S);
    }
}

```

Question 7.

```

class HQ7
{
    public static int[] swap(int arr[], int start, int end, int item)
    {
        if(start>end)
            return arr;
        else if(arr[start]<=item)
            return swap(arr, ++start, end, item);
        else if(arr[end]>item)
            return swap(arr, start, --end, item);
        else
        {
            int temp = arr[start];
            arr[start] = arr[end];
            arr[end] = temp;
            return swap(arr, ++start, --end, item);
        }
    }
    public static void display(int arr[])
    {
        for(int i = 0;i<arr.length;i++)
        {
            System.out.print(arr[i]+" ");
        }
    }
}

```

```

    public static void main(String[] args)
    {
        int arr[]={3, 9, 4, 11, 5, 1, 7};
        arr = swap(arr,0,arr.length-1,5);
        display(arr);
    }
}

```

Question 8.

```

class HQ8
{
    public static void towerOfHanoi(int n, char from_rod, char to_rod, char
helper_rod)
    {
        if (n == 1)
        {
            System.out.println("Take disk 1 from rod " + from_rod + " to rod " +
to_rod);
            return;
        }
        towerOfHanoi(n-1, from_rod, helper_rod, to_rod);
        System.out.println("Take disk " + n + " from rod " + from_rod + " to rod " +
to_rod);
        towerOfHanoi(n-1, helper_rod, to_rod, from_rod);
    }
    public static void main(String[] args)
    {
        int n = 4;
        towerOfHanoi(n,'A','C', 'B');
    }
}

```