Solution of Assignment 3

Question 1.

```java
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.

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

```java
{
        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;
        }
```

```java
        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.

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

```java
        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());

                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());

                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);
```

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

Question 5.

```java
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.

```java
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;
```

```java
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.

```java
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)
        {
```

```java
            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.

```java
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.

```java
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.

```java
import java.util.Scanner;

class HQ3
{
        public static int DtoB(int n)
        {
                if(n<2)
                        return n;
                else
```

```java
                return (n%2)+10*DtoB(n/2);
        }
        public static void main(String[] args)
        {
                Scanner sc = new Scanner(System.in);
                System.out.println("Enter the decimal number: ");
                int n = sc.nextInt();
                System.out.print("Binary to Decimal of "+n+" is "+DtoB(n));
        }
}
```

Question 4.

```java
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.

```java
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.

```java
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");
```

```java
        }
        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.

```java
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)
        {
```

```java
                int arr[]={3, 9, 4, 11, 5, 1, 7};
                arr = swap(arr,0,arr.length-1,5);
                display(arr);
        }
}
```

Question 8.

```java
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');
        }
}
```