EXPERIMENT NO. 3

AIM: To implement Fuzzy Set Operations (Algebraic Sum, Algebraic Product, Bounded Sum, Bounded Difference).

/*

Two Fuzzy Sets are given:

A={0.9/2 + 0.4/4 + 0.4/6 + 0.7/8 + 0/10}

B={0.2/2 + 0.8/4 + 0.5/6 + 0.3/8 + 1/10}.

Implement Fuzzy Set Operations (Algebraic Sum, Algebraic Product, Bounded Sum, Bounded Difference).

*/

PROGRAM:

```
import java.util.Scanner;


class Fuzzyset_ag
{
Scanner sc=new Scanner(System.in);
int len;
Fuzzyset_ag(int len)
{
this.len=len;
}
float[] ag_sum_pro(float mA[], float mB[], String op)
{
float ag_sum_pro[]=new float[10];
for(int i=0;i<len;i++)
{
ag_sum_pro[i]=(op=="sum")?(mA[i]+mB[i]-mA[i]*mB[i]):(mA[i]*mB[i]);
}
return ag_sum_pro;
}
float[] bound_sum_diff(float A[], float B[], String op)
{
```

```
float bound_sum_diff[]=new float[10];
for(int i=0;i<len;i++)
{
bound_sum_diff[i]=(op=="bound_diff")?((0>A[i]-B[i])?0.0f:(A[i]-B[i])):((1>A[i]+B[i])?A[i]+B[i]:1.0f);
}
return bound_sum_diff;
}
float[] scan_set()
{
float S[]=new float[10];
for(int i=0;i<len;i++)
{
S[i]=sc.nextFloat();
}
return S;
}

void Fuzzyset_print(float E[], float m[])
{
System.out.format("{%.3f/%.2f", m[0], E[0]);
for(int i=1;i<len;i++)
{
System.out.format("+%.3f/%.2f", m[i], E[i]);
}
System.out.println("}");
}
}

class Fuzzyset_ag_op
{
public static void main(String args[])
```

```
{
System.out.print("Enter the no. of elements(max 10):-");
Scanner sc=new Scanner(System.in);
Fuzzyset_ag FZ=new Fuzzyset_ag(sc.nextInt());
System.out.print("Enter the elements of Fuzzy set A & B:-");
float E[]=FZ.scan_set();
System.out.print("Enter the membership value of elements Fuzzy set A:-");
float mA[]=FZ.scan_set();
System.out.print("Enter the membership value of elements Fuzzy set B:-");
float mB[]=FZ.scan_set();

System.out.print("\nFuzzy Set A:-");
FZ.Fuzzyset_print(E, mA);
System.out.print("Fuzzy Set B:-");
FZ.Fuzzyset_print(E, mB);

System.out.print("\nAlgebraic Sum of Fuzzy Sets A & B:-\n A + B:-");
FZ.Fuzzyset_print(E, FZ.ag_sum_pro(mA, mB, "sum"));
System.out.print("Algebraic Sum of Fuzzy Sets A & B:-\nA.B:-");
FZ.Fuzzyset_print(E, FZ.ag_sum_pro(mA, mB, "product"));

System.out.print("\nBounded Sum of Fuzzy Sets A & B:-\n");
FZ.Fuzzyset_print(E, FZ.bound_sum_diff(mA, mB, "bound_sum"));
System.out.print("Bounded Difference of Fuzzy Sets A & B:-\n");
FZ.Fuzzyset_print(E, FZ.bound_sum_diff(mA, mB, "bound_diff"));
}
}
```

OUTPUT:

```
ce-306pc08@ce306pc04: ~
ce-306pc08@ce306pc04:~$ javac Fuzzyset_ag_op.java
ce-306pc08@ce306pc04:~$ java Fuzzyset_ag_op
Enter the no. of elements(max 10):-5
Enter the elements of Fuzzy set A & B:-2 4 6 8 10
Enter the membership value of elements Fuzzy set A:-0.9 0.4 0.4 0.7 0.0
Enter the membership value of elements Fuzzy set B:-0.2 0.8 0.5 0.3 1.0

Fuzzy Set A:-{0.900/2.00+0.400/4.00+0.400/6.00+0.700/8.00+0.000/10.00}
Fuzzy Set B:-{0.200/2.00+0.800/4.00+0.500/6.00+0.300/8.00+1.000/10.00}

Algebraic Sum of Fuzzy Sets A & B:-
 A + B:-{0.920/2.00+0.880/4.00+0.700/6.00+0.790/8.00+1.000/10.00}
Algebraic Sum of Fuzzy Sets A & B:-
A.B:-{0.180/2.00+0.320/4.00+0.200/6.00+0.210/8.00+0.000/10.00}

Bounded Sum of Fuzzy Sets A & B:-
{1.000/2.00+1.000/4.00+0.900/6.00+1.000/8.00+1.000/10.00}
Bounded Difference of Fuzzy Sets A & B:-
{0.700/2.00+0.000/4.00+0.000/6.00+0.400/8.00+0.000/10.00}
ce-306pc08@ce306pc04:~$
```

```
ce-306pc08@ce306pc04: ~
ce-306pc08@ce306pc04:~$ javac Fuzzyset_ag_op.java
ce-306pc08@ce306pc04:~$ java Fuzzyset_ag_op
Enter the no. of elements(max 10):-4
Enter the elements of Fuzzy set A & B:-1 2 3 4
Enter the membership value of elements Fuzzy set A:-0.2 0.3 0.4 0.5
Enter the membership value of elements Fuzzy set B:-0.1 0.2 0.2 1.0

Fuzzy Set A:-{0.200/1.00+0.300/2.00+0.400/3.00+0.500/4.00}
Fuzzy Set B:-{0.100/1.00+0.200/2.00+0.200/3.00+1.000/4.00}

Algebraic Sum of Fuzzy Sets A & B:-
 A + B:-{0.280/1.00+0.440/2.00+0.520/3.00+1.000/4.00}
Algebraic Sum of Fuzzy Sets A & B:-
A.B:-{0.020/1.00+0.060/2.00+0.080/3.00+0.500/4.00}

Bounded Sum of Fuzzy Sets A & B:-
{0.300/1.00+0.500/2.00+0.600/3.00+1.000/4.00}
Bounded Difference of Fuzzy Sets A & B:-
{0.100/1.00+0.100/2.00+0.200/3.00+0.000/4.00}
ce-306pc08@ce306pc04:~$
```

CONCLUSION: Thus the Fuzzy Set Operations (Algebraic Sum, Algebraic Product, Bounded Sum, Bounded Difference) for the given two Fuzzy Sets

A={0.9/2 + 0.4/4 + 0.4/6 + 0.7/8 + 0/10}

B={0.2/2 + 0.8/4 + 0.5/6 + 0.3/8 + 1/10}.

Has been successfully implemented.