

```
%PERSONAL DETAILS
```

```
%MATLAB PROGRAMMING ASSIGNMENT II
```

```
%ROLL NUMBER: SYCO01
```

```
%PRN: 1212121212
```

```
%NAME: DINESH BABAN KUTE
```

```
%Triangular Membership Function
```

```
%Syntax: y = trimf(x,params)
```

```
%Example
```

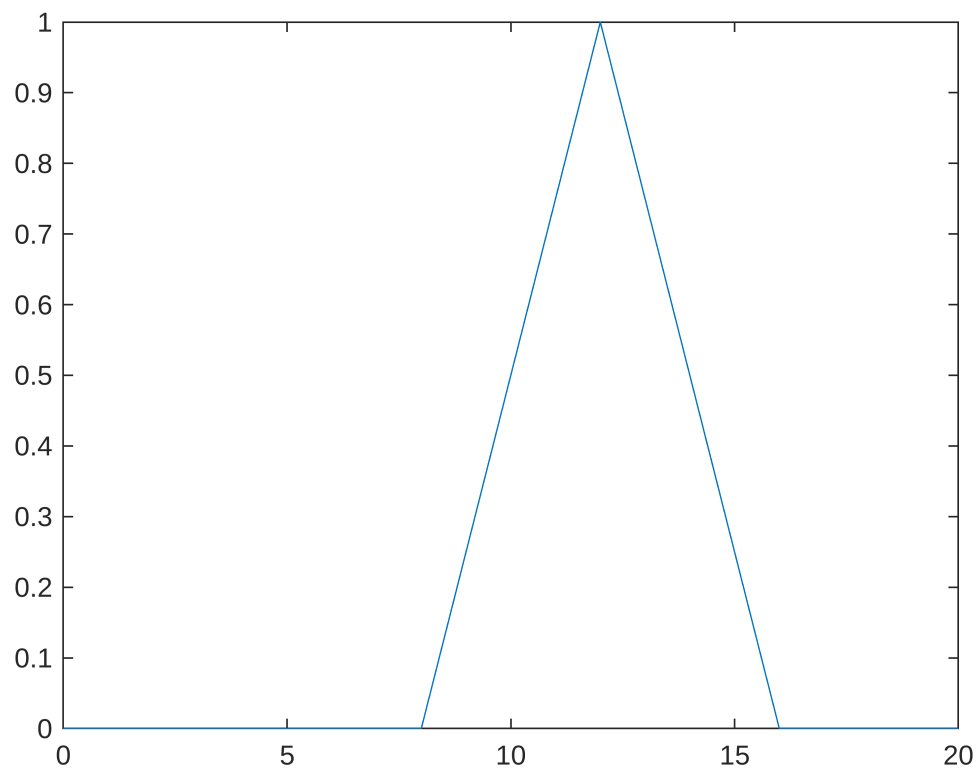
```
x1=0:0.2:20
```

```
x1 = 1x101
      0      0.2000      0.4000      0.6000      0.8000      1.0000      1.2000      1.4000 ...
```

```
y1=trimf(x,[8 12 16])
```

```
y1 = 1x101
      0          0          0          0          0          0          0          0 ...
```

```
plot(x,y)
```



```
%Trapezoidal Membership Function
```

```
%Syntax: y = trapmf(x,params)
```

```
%Example
```

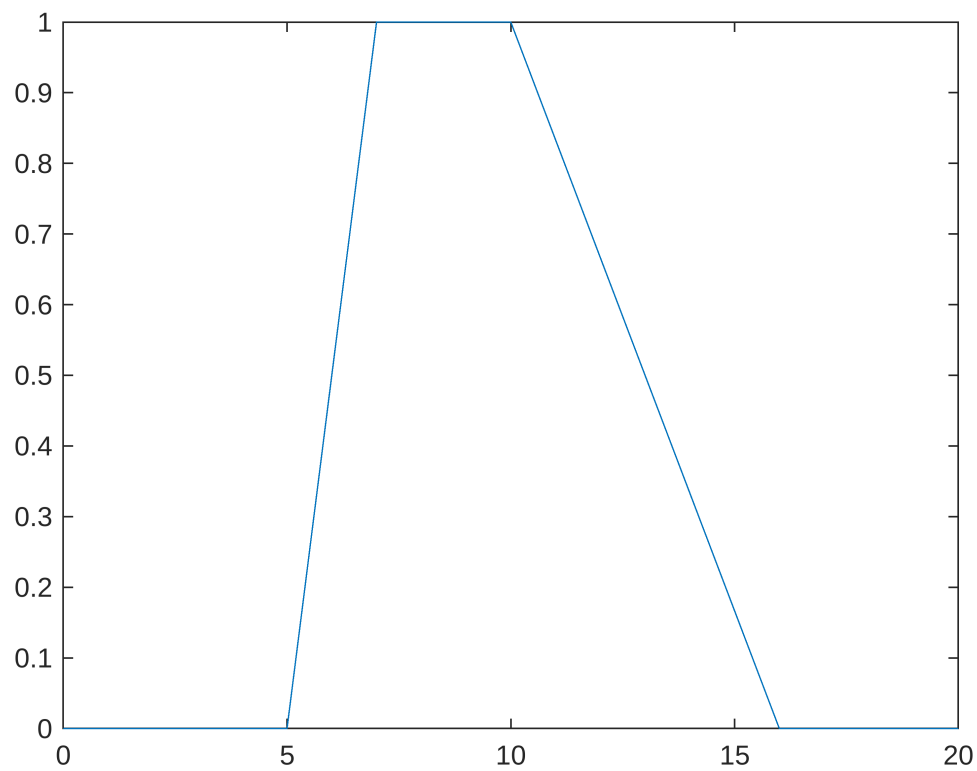
```
x2=0:0.2:20
```

```
x2 = 1×101
      0      0.2000      0.4000      0.6000      0.8000      1.0000      1.2000      1.4000 ...
```

```
y2 = trapmf(x,[5 7 10 16])
```

```
y2 = 1×101
      0      0      0      0      0      0      0      0 ...
```

```
plot(x2,y2)
```



```
%Sigmoidal Membership Function
```

```
%Syntax: y = sigmf(x,params)
```

```
%Example
```

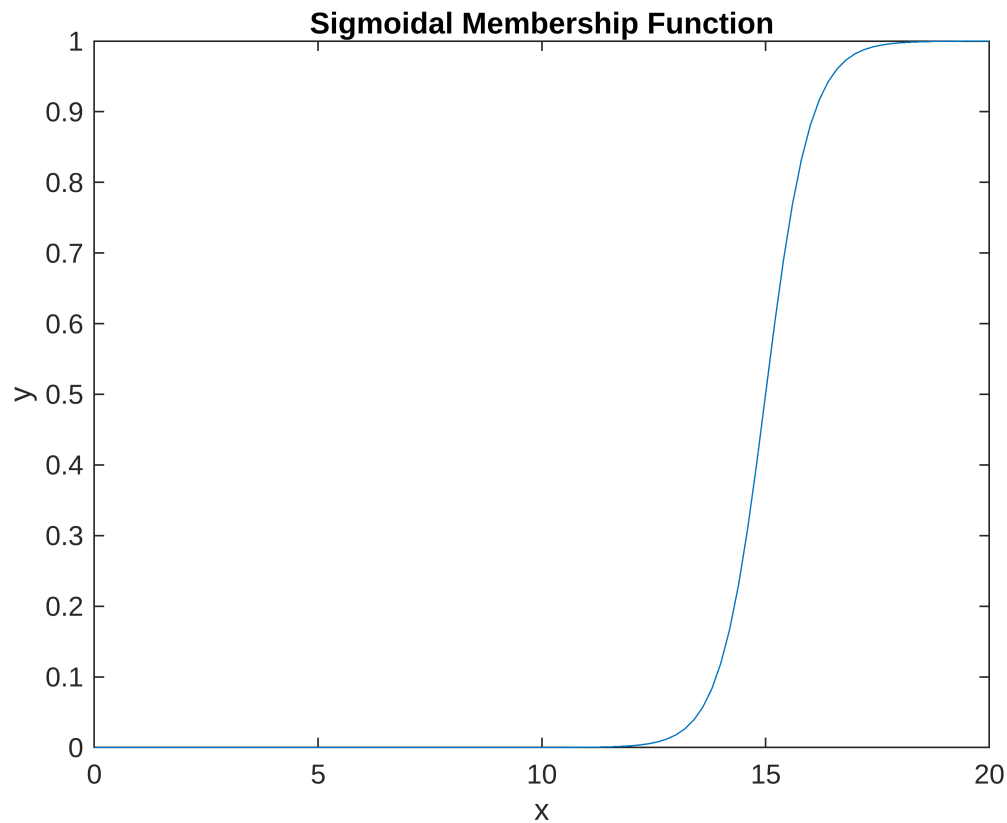
```
x3=0:0.2:20
```

```
x3 = 1x101
      0      0.2000      0.4000      0.6000      0.8000      1.0000      1.2000      1.4000 ...
```

```
y3 = sigmf(x,[2 15])
```

```
y3 = 1x101
      0.0000      0.0000      0.0000      0.0000      0.0000      0.0000      0.0000      0.0000 ...
```

```
plot(x3,y3)
```



```
%Gaussian Membership Function
```

```
%Syntax: y = gaussmf(x,params)
```

```
%Example
```

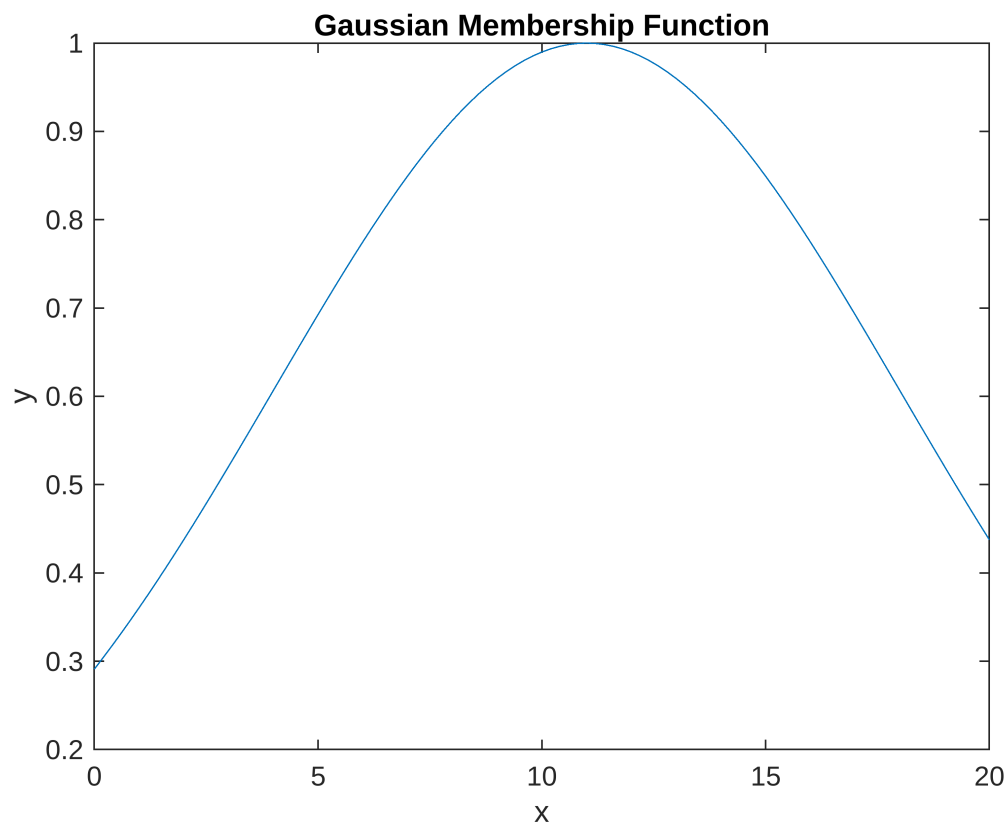
```
x4=0:0.2:20
```

```
x4 = 1x101
      0      0.2000      0.4000      0.6000      0.8000      1.0000      1.2000      1.4000 ...
```

```
y4 = gaussmf(x,[7 11])
```

```
y4 = 1x101
      0.2909      0.3042      0.3177      0.3317      0.3459      0.3604      0.3753      0.3905 ...
```

```
plot(x4,y4)
```



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```
%Defuzzification Methods
```

```
% 1) Center of Gravity / Centroid
```

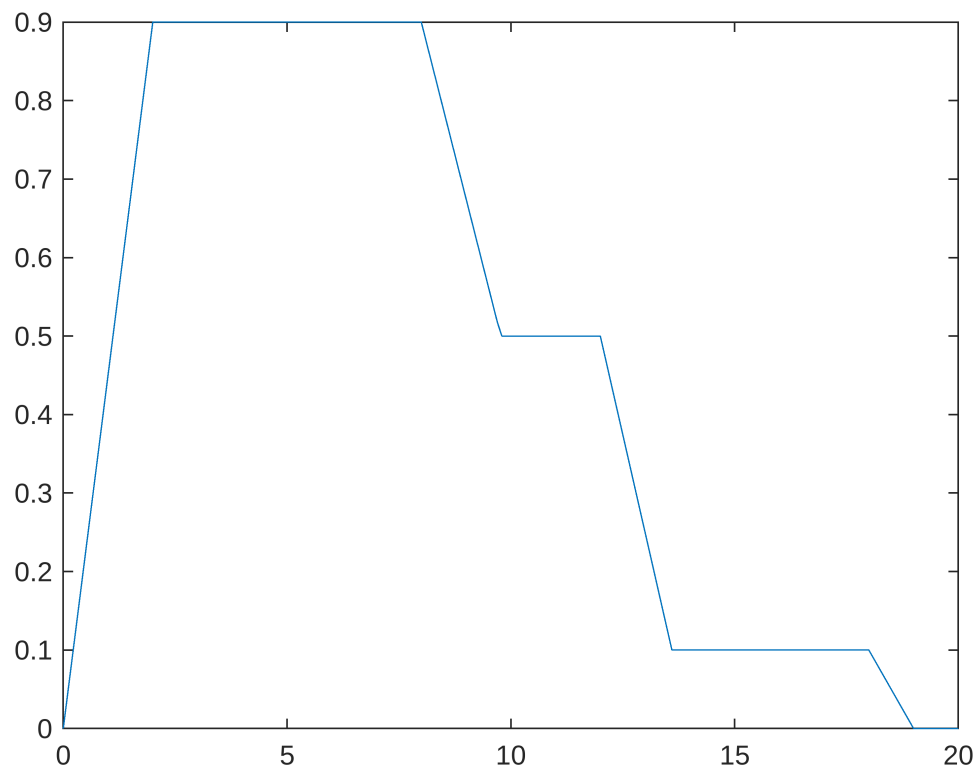
```
x = 0:0.1:20
```

```
x = 1x201
      0      0.1000      0.2000      0.3000      0.4000      0.5000      0.6000      0.7000 ...
```

```
mf1 = trapmf(x,[0 2 8 12]);
mf2 = trapmf(x,[5 7 12 14]);
mf3 = trapmf(x,[12 13 18 19]);
mf = max(0.5*mf2,max(0.9*mf1,0.1*mf3))
```

```
mf = 1x201
      0      0.0450      0.0900      0.1350      0.1800      0.2250      0.2700      0.3150 ...
```

```
plot(x,mf)
```



```
xCentroid = defuzz(x,mf,'centroid')
```

```
xCentroid = 6.7719
```

```
% 2) Middle of Maxima (MOM)
```

```
xMOM = defuzz(x,mf,'mom')
```

```
xMOM = 5
```

```
% 3) First of Maxima / Smallest of Maxima (SOM)
```

```
xSOM = defuzz(x,mf,'som')
```

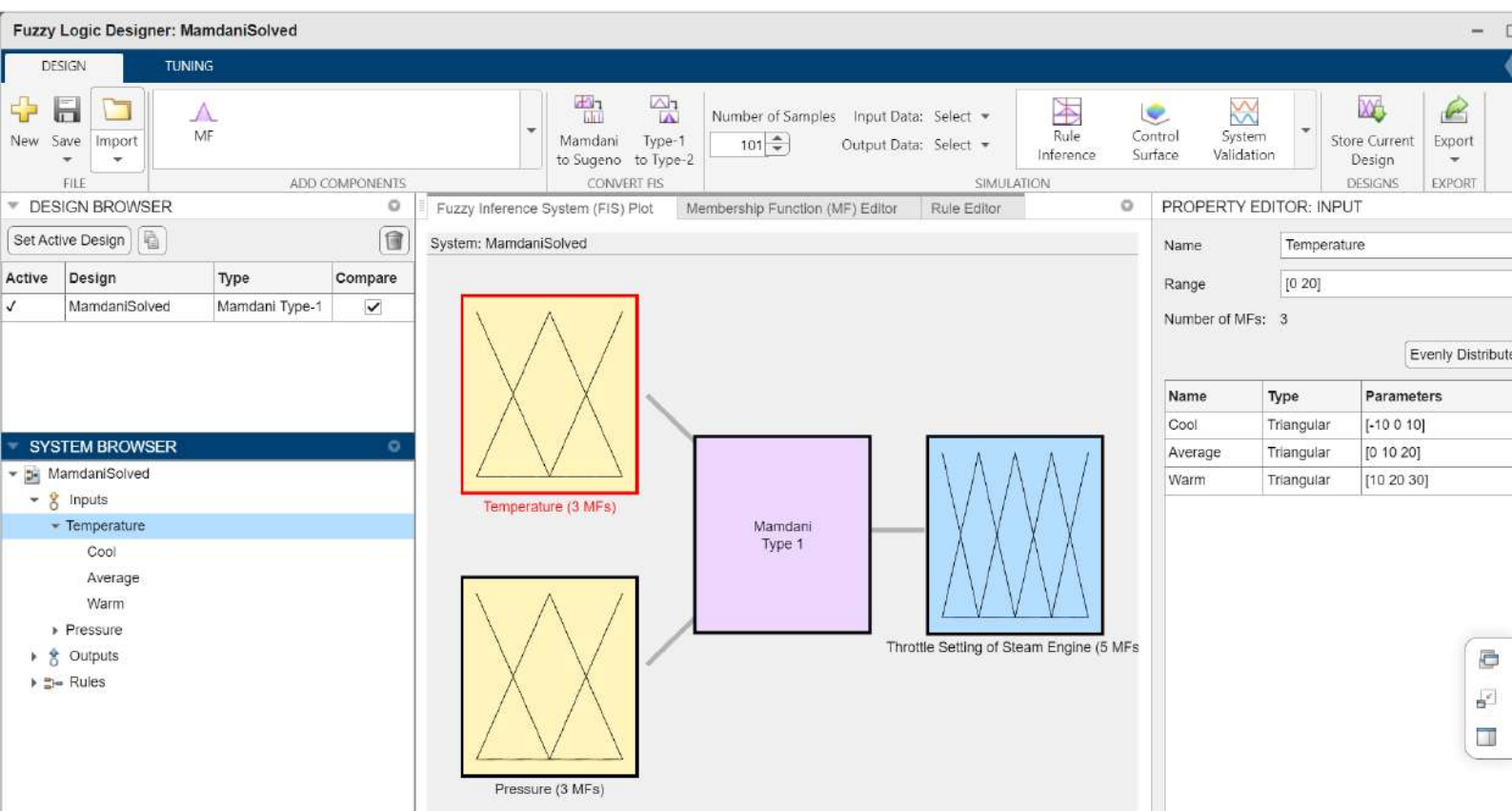
```
xSOM = 2
```

```
% 4) Last of Maxima / Largest of Maxima (LOM)
```

```
xLOM = defuzz(x,mf,'lom')
```

```
xLOM = 8
```

MAMDANI INFERENCE SYSTEM USING MATLAB



Prepared by Dinesh Kute

Fuzzy Logic Designer: MamdaniSolved

DESIGN TUNING

New Save Import MF

FILE ADD COMPONENTS

Mamdani to Sugeno Type-1 to Type-2 CONVERT FIS

Number of Samples 101 Input Data: Select Output Data: Select

Rule Inference Control Surface System Validation

Store Current Design Export DESIGNS EXPORT

DESIGN BROWSER

Set Active Design

Active	Design	Type	Compare
✓	MamdaniSolved	Mamdani Type-1	✓

SYSTEM BROWSER

- MamdaniSolved
 - Inputs
 - Temperature
 - Cool
 - Average
 - Warm
 - Pressure
 - Low
 - Ok
 - Strong
 - Outputs
 - Rules

Fuzzy Inference System (FIS) Plot Membership Function (MF) Editor Rule Editor

System: MamdaniSolved

Temperature (3 MFs)

Mamdani Type 1

Throttle Setting of Steam Engine (5 MFs)

Pressure (3 MFs)

PROPERTY EDITOR: INPUT

Name Pressure

Range [0 50]

Number of MFs: 3

Evenly Distribute

Name	Type	Parameters
Low	Triangular	[-25 0 25]
Ok	Triangular	[0 25 50]
Strong	Triangular	[25 50 75]

Prepared by Dinesh Kute

Fuzzy Logic Designer: MamdaniSolved

DESIGN TUNING

New Save Import MF

File ADD COMPONENTS

Mamdani to Sugeno Type-1 to Type-2

Number of Samples Input Data: Select Output Data: Select

101

Rule Inference Control Surface System Validation

Store Current Design Export

DESIGNS EXPORT

DESIGN BROWSER

Set Active Design

Active	Design	Type	Compare
✓	MamdaniSolved	Mamdani Type-1	✓

SYSTEM BROWSER

- Cool
- Average
- Warm
- Pressure
 - Low
 - Ok
 - Strong
- Outputs
 - Throttle Setting of Steam Engine
 - N2
 - N1
 - Z
 - P1
 - P2

Fuzzy Inference System (FIS) Plot Membership Function (MF) Editor Rule Editor

System: MamdaniSolved

Temperature (3 MFs)

Pressure (3 MFs)

Mamdani Type 1

Throttle Setting of Steam Engine (5 MFs)

PROPERTY EDITOR: OUTPUT

Name Throttle Setting of Steam Engine

Range [-60 60]

Number of MFs: 5

Evenly Distribute

Name	Type	Parameters
N2	Triangular	[-90 -60 -30]
N1	Triangular	[-60 -30 0]
Z	Triangular	[-30 0 30]
P1	Triangular	[0 30 60]
P2	Triangular	[30 60 90]

Prepared by Dinesh Kute

Fuzzy Logic Designer: MamdaniSolved

DESIGN TUNING

New Save Import Rule Add All Rules

FILE ADD COMPONENTS CONVERT FIS

Mamdani to Sugeno Type-1 to Type-2

Number of Samples: 101 Input Data: Select Output Data: Select

Rule Inference Control Surface System Validation

Store Current Design Export

DESIGN BROWSER

System: MamdaniSolved

Temperature (3 MFs)

Pressure (3 MFs)

Mamdani Type 1

Throttle Setting of Steam Engine (5 MFs)

PROPERTY EDITOR: RULES

Number of rules: 9

Rule	Rule
1	If (Temperature is Cool) and (Pressure is Low) then (Throttle Setting of Steam Engine is P2) (1)
2	If (Temperature is Average) and (Pressure is Low) then (Throttle Setting of Steam Engine is P2) (1)
3	If (Temperature is Warm) and (Pressure is Low) then (Throttle Setting of Steam Engine is P1) (1)
4	If (Temperature is Cool) and (Pressure is Ok) then (Throttle Setting of Steam Engine is Z) (1)
5	If (Temperature is Average) and (Pressure is Ok) then (Throttle Setting of Steam Engine is Z) (1)
6	If (Temperature is Warm) and (Pressure is Ok) then (Throttle Setting of Steam Engine is N2) (1)
7	If (Temperature is Cool) and (Pressure is Strong) then (Throttle Setting of Steam Engine is N2) (1)
8	If (Temperature is Average) and (Pressure is Strong) then (Throttle Setting of Steam Engine is N1) (1)
9	If (Temperature is Warm) and (Pressure is Strong) then (Throttle Setting of Steam Engine is N1) (1)

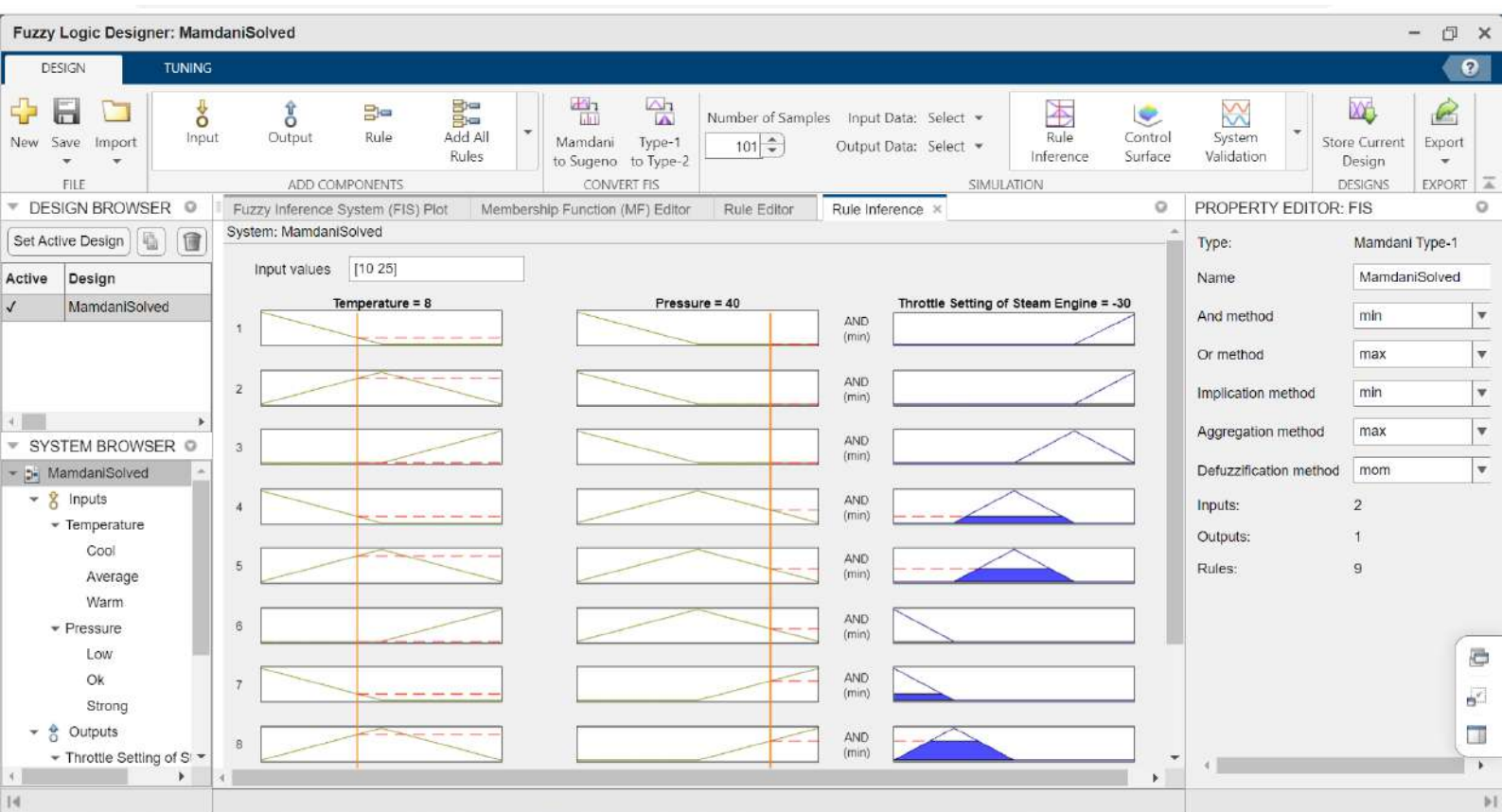
Preview

Name:

Weight:

Description:

Prepared by Dinesh Kute



Prepared by Dinesh Kute