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Academic Year	:	2022-23	**Semester**	:	
Course code	:		**Course name**	:	Artificial Intelligence
Name:	:		**Seat No.**	:	

Practical-2

❖ **Aim:- Design a controller to determine wash time of a domestic washing machine. Assume the input is dirt and grease on clothes. Use three descriptors for input variables and five descriptors for output variables. Derive the set of rules for controller action and defuzzification. The design should be supported by the figure wherever possible. Show that if the clothes are solid to a larger degree the wash time will be more and vice versa.**

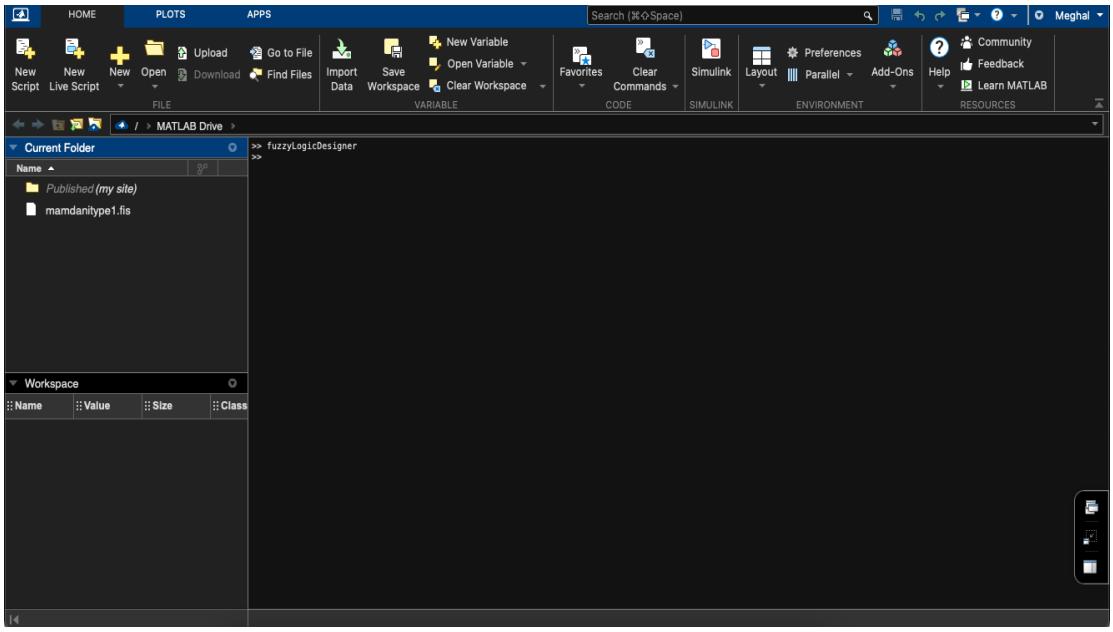
❖ **Software Requirements:- MATLAB, FUZZY LOGIC DESIGNER**

❖ Knowledge Required:-

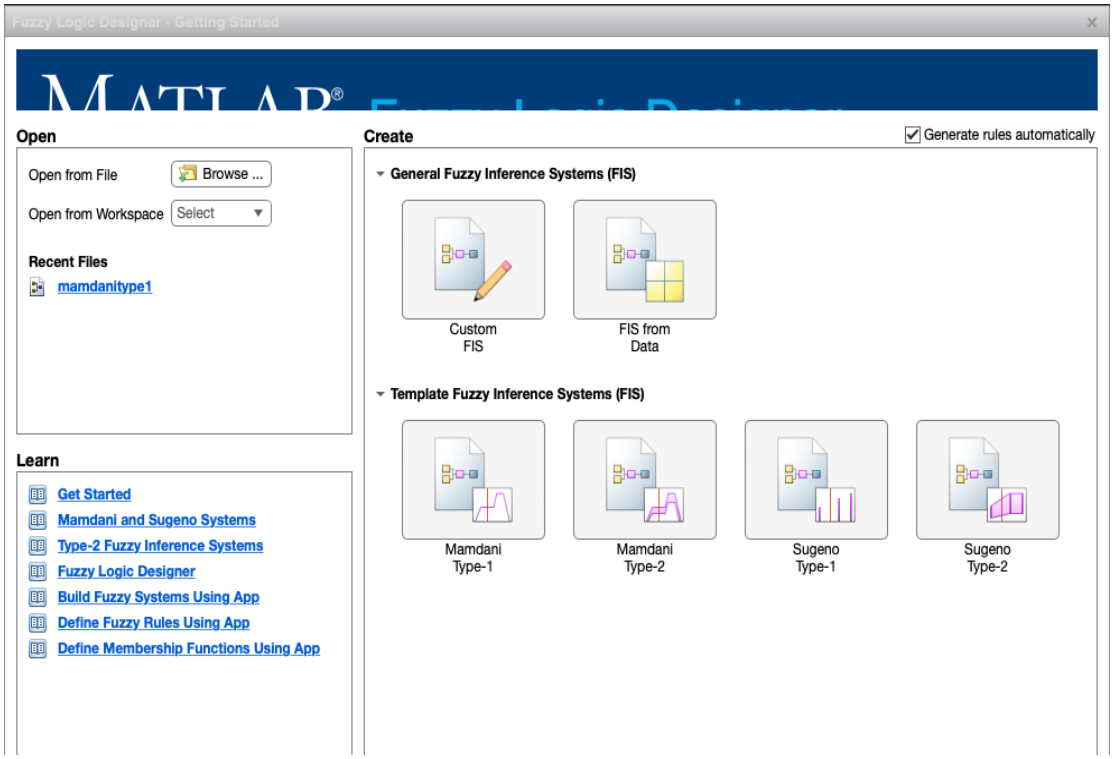
❖ Theory Required:-

❖ Steps:-

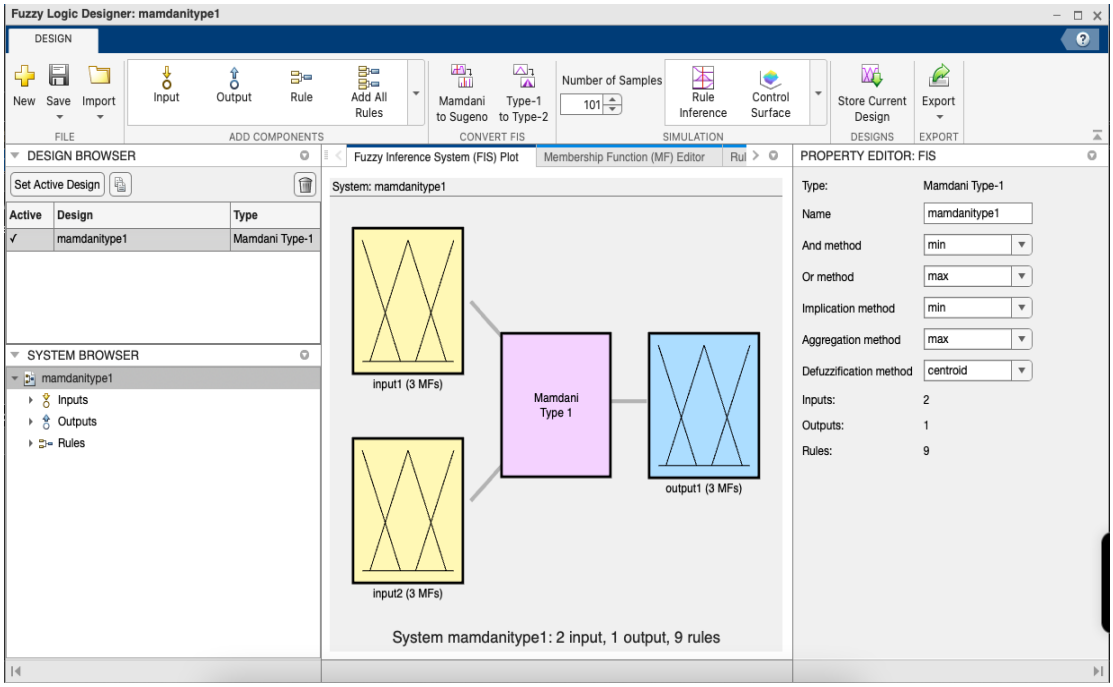
1. Once signing in and starting online MATLAB Workspace, we can see the compiler window where we need to run the command named ***fuzzyLogicDesigner*** pressing enter.



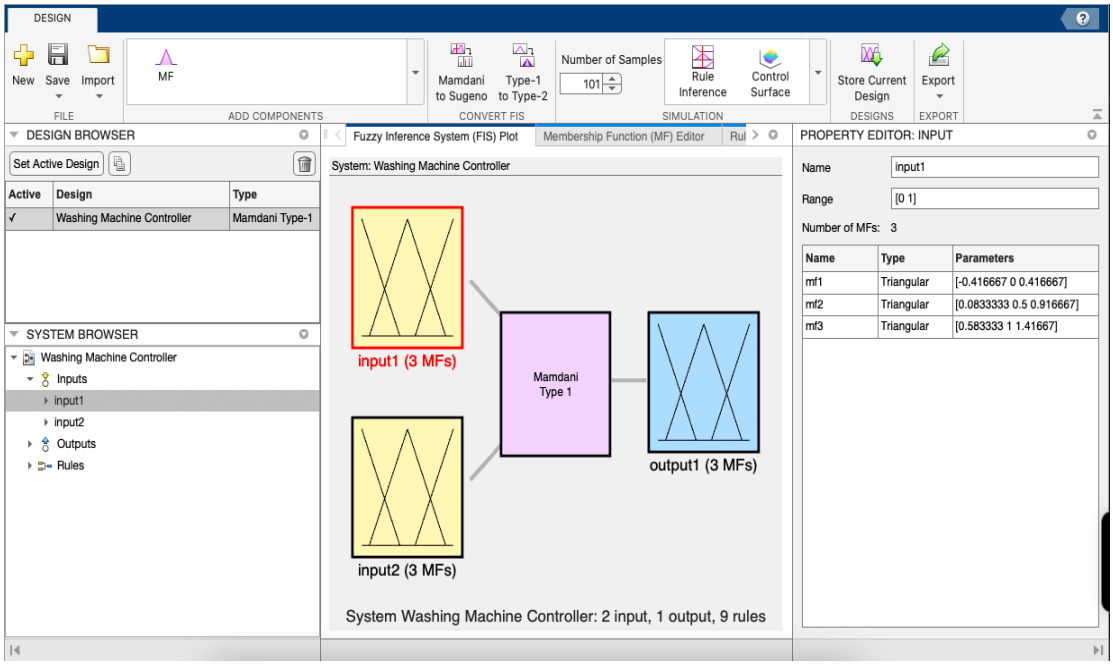
2. After pressing the enter key, a new window will pop up(as shown below).



3. In that window, we need to select ***Mamdani Type-1*** and it will open a similar workspace, edit this workspace name from mamdanitype1 to **Washing Machine Controller** from the right side panel.



4. In this, when we double click on input 1 (3 MFs), we can see the dialog box named ***Property Editor: INPUT***.



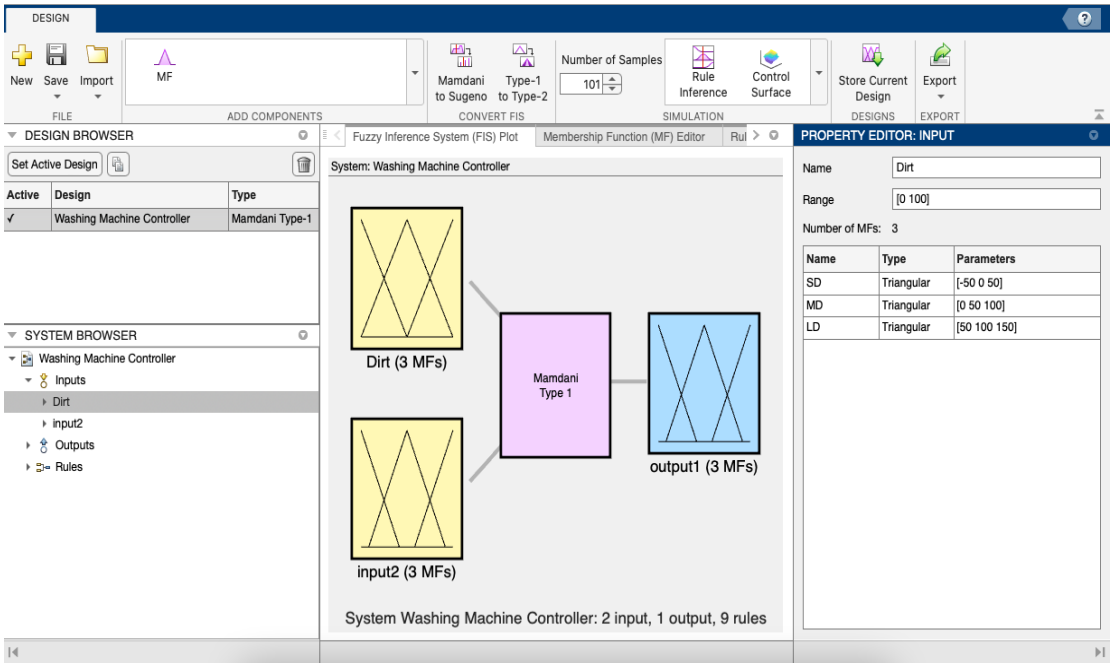
5. Further, we need to edit the columns for Membership Functions i.e. Name, Range, Parameters as shown below.

Input Name: input1 —> Dirt

Range: [0 10] —> [0 100]

For MFs:

Name	Parameters
mf1 —> SD	[-50 0 50]
mf2 —> MD	[0 50 100]
mf3 —> LD	[50 100 150]



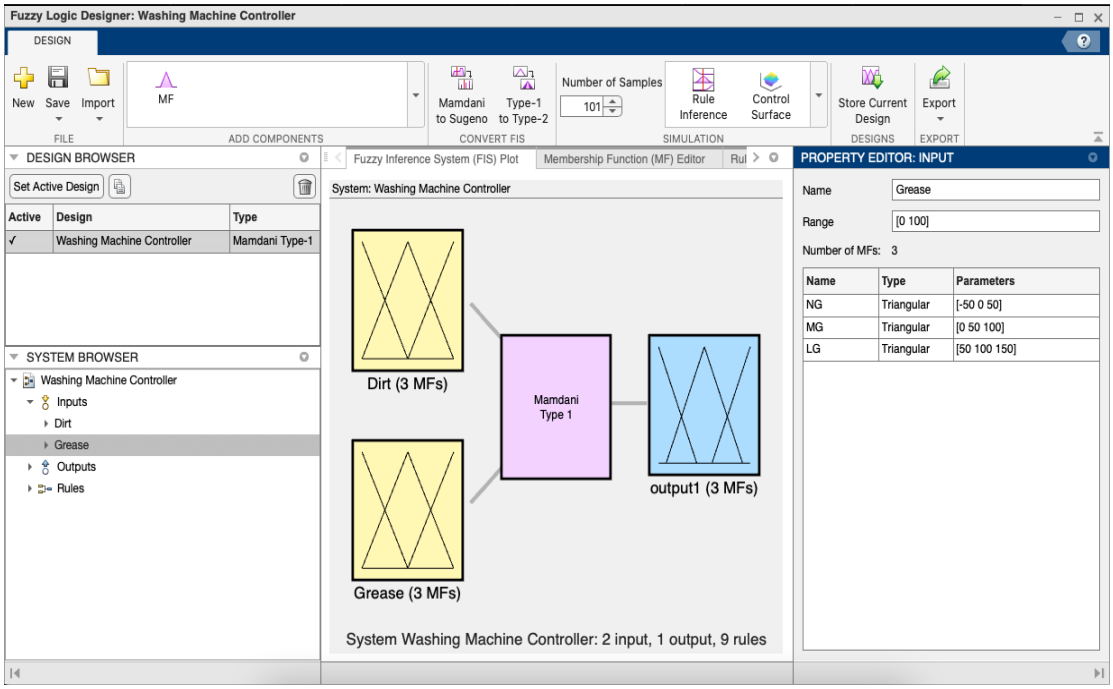
6. In the similar way after selecting input 2 (3 MFs), we need to edit the columns for Membership Functions i.e. Name, Range, Parameters as shown below.

Input Name: input2 —> Grease

Range: [0 10] —> [0 100]

For MFs:

Name	Parameters
mf1 —> NG	[-50 0 50]
mf2 —> MG	[0 50 100]
mf3 —> LG	[50 100 150]



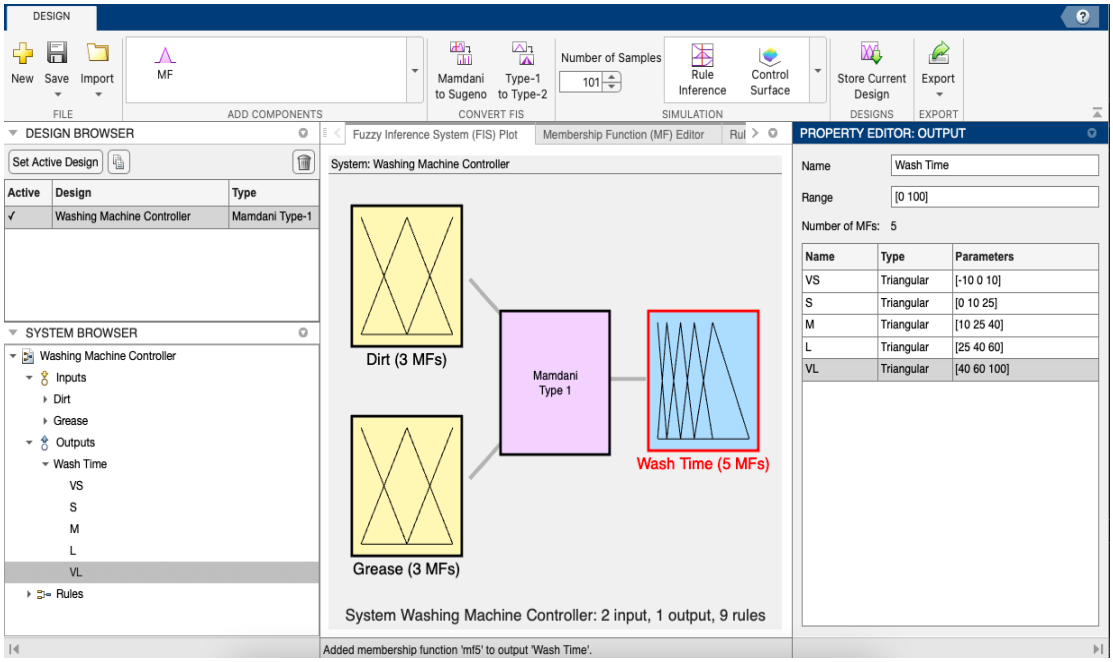
7. Further on selecting output object, we need to edit the columns for Membership Functions i.e. Name, Range, Parameters as shown below and also need to add 2 more MFs.

Input Name: output —> Wash Time

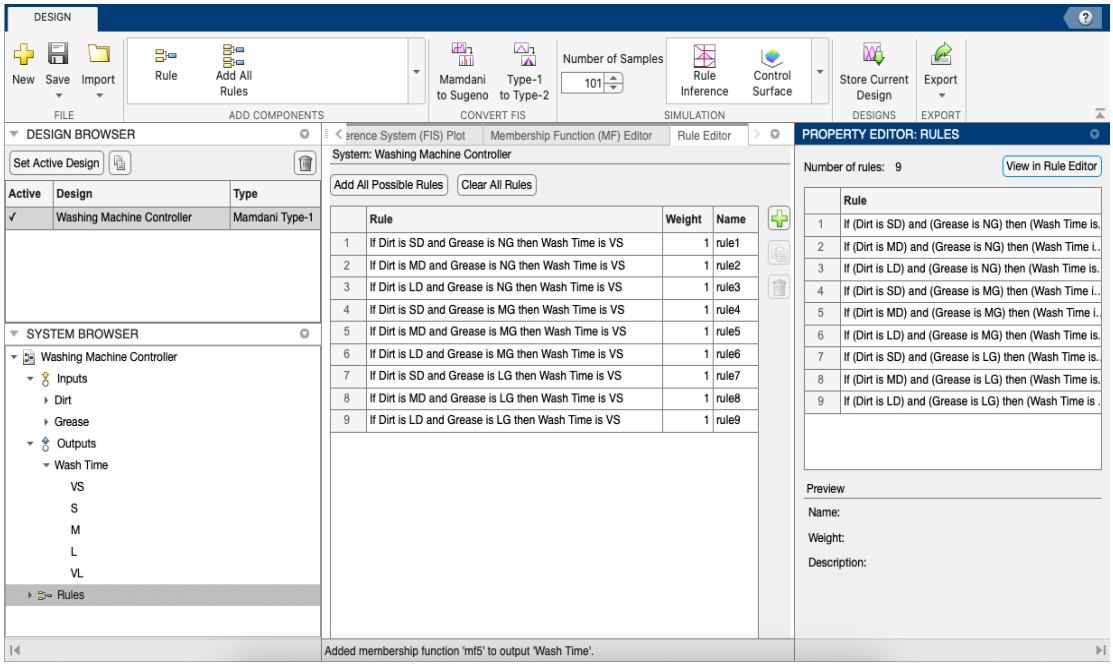
Range: [0 10] —> [0 100]

For MFs:

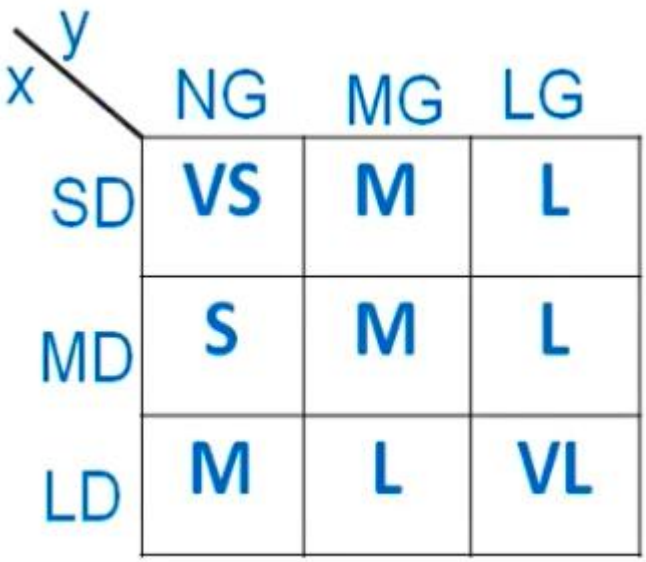
Name	Parameters
mf1 —> VS	[-10 0 10]
mf2 —> S	[0 10 25]
mf3 —> M	[10 25 40]
mf4 —> L	[25 40 60]
mf5 —> VL	[40 60 100]



8. Now, on selecting the Mamdani Type 1 object, we can see the ***Property Editor: RULES*** on the right side. Further, on clicking View in Rule Editor below the shown box will be opened.



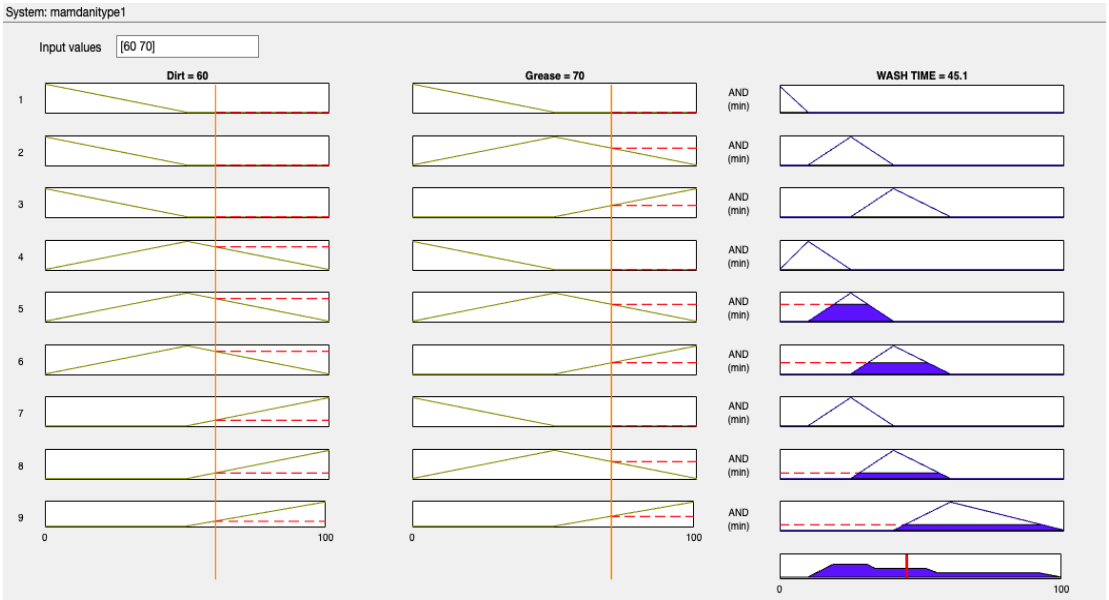
9. Thereon, we will clear all the existing rules and will add new rules according to the table below.



10. After adding the rules, we will have the below image.

	Rule	Weight	Name
1	If Dirt is SD and Grease is NG then WASH TIME is VS	1	rule1
2	If Dirt is SD and Grease is MG then WASH TIME is M	1	rule2
3	If Dirt is SD and Grease is LG then WASH TIME is L	1	rule3
4	If Dirt is MD and Grease is NG then WASH TIME is S	1	rule4
5	If Dirt is MD and Grease is MG then WASH TIME is M	1	rule5
6	If Dirt is MD and Grease is LG then WASH TIME is L	1	rule6
7	If Dirt is LD and Grease is NG then WASH TIME is M	1	rule7
8	If Dirt is LD and Grease is MG then WASH TIME is L	1	rule8
9	If Dirt is LD and Grease is LG then WASH TIME is VL	1	rule9

11. After this, we will open the Rule Inference Tab(from Top Panel) where we need to change the input values from [50 50] to [60 70], Dirt & Grease respectively.



12. The final Wash Time = _____ **minutes.**

❖ **Applications**:-

❖ **Advantages**:-

- **Disadvantages:-**

- **Conclusion:-**

- **Related Questions:-**

Grade / Marks
(_____ / 10)

Sign of Lab Teacher with Date