Roll N	umber:						
	Thapar Institute of Engin	neering and	Technology, I	Patiala			
	Computer Science an	nd Engineer	ring Departme	ent			
BE(3 rd	Year) Dec 9, 2022 EST		J	JML501	: Machine L	earning	
Time: 3 Hours		Marks				larks:40	
Instruc	tors: Dr. Singara Singh Kasana, Dr. M	aninder Ka	ur, Dr. Jatin B	edi, Dr.	Raman Go	yal, Dr.	
Harpre	et Singh, Dr. Swati						
ote: All	questions are compulsory. All parts of a	question mu	st be answered	in order.	Show all int	ermedi	
eps, whe	ere applicable.						
Q 1	Consider the training examples she	own in tab	le below for	a binary	classificat	ion [8	
	problem.						
	(a) What are the information gains	s of car_typ	e and first_own	ner relati	ve to the gi	ven	
	training examples?						
	(b) For rating, which is a conti			the infe	ormation ga	iins	
	(considering two split point cho				C .		
	(c) In continuous of (a) and (b), w			g car_ty	oe, first_owi	ner,	
	and rating) according to the inf (d) What is the best split (between			r) accord	ing to the C	lini	
	index?	ir car_type a	ind mst_owner	accord	ing to the C	11111	
	Sample	car_type	first owner	rating	buys		
		Sedan	yes	1.0	True		
	2	Sedan	yes	6.0	True		
	3	Sedan	no	5.0	False		
	4	SUV	no	4.0	True		
	5	SUV	yes	7.0	False		
	6	SUV	yes	3.0	False		
	7	SUV	no	8.0	False		
	8	Sedan	no	7.0	True		
	9	SUV	yes	5.0	False		
Q 2	(a) Use single and complete link aggle					l by [
V -							
	the following distance matrix. Show output at each step and represent the clustering results with dendrograms						
	A	ВС	D				
	A 0	1 4	5				
	В	0 2	6				
	C	0	3				
	D		0				
	(b) Wiles	W		ggrazz.	2		
	(b) Why we need hyper parameter parameters in SVM?	r tuning in	SVM? Explair	differe	nt hyper-tun	ing [
Q 3	(a) Derive the coefficients equation	on of multin	le linear ragra	ssion us	na least so		
	method.	or munip	no micai regre	ooioii usi	ing icast squ	iare [4	

	(b) Normalize the data: 8, 10, 15, a	and 20 by using min-max and z-score approach.	[4]
2 4	For the given Neural Network, find (upon) (a) error using forward propagation (b) updated weights w ₁₄ (Use Sign)		[8]
	$w_{18} = -0.3$ $w_{14} = 0.4$ $w_{24} = 0.4$ $w_{25} = 0.1$	$b_{4} = -0.4$ $W_{46} = -0.3$ $W_{56} = 0.1$ $Actual$ Output = 1	
		$b \rightarrow Bias$ $b_5 = 0.2$ added upto two decimal places. Use learning rate=0.9 $acted$) ² . In above figure, take $W_{34} = -0.5$, $W_{35} = 0.5$	
) 5	All intermediate results should be roun	$\theta_5 = 0.2$	
) 5	All intermediate results should be roun error formula $E = \frac{1}{2}(actual - prediction 1)$	$b_5 = 0.2$ aded upto two decimal places. Use learning rate=0.9 acted) ² . In above figure, take $W_{34} = -0.5$, $W_{35} = 0.5$	2
) 5	All intermediate results should be roun error formula $E = \frac{1}{2}(actual - prediction)$ Consider the following transactions:	$b_5 = 0.2$ aded upto two decimal places. Use learning rate=0.9 acted) ² . In above figure, take $W_{34} = -0.5$, $W_{35} = 0.5$	2
) 5	All intermediate results should be roun error formula $E = \frac{1}{2}(actual - predictions)$ Consider the following transactions: Transaction	$b_5 = 0.2$ Ided upto two decimal places. Use learning rate=0.9 and $cted$) ² . In above figure, take $W_{34} = -0.5$, $W_{35} = 0.5$. Items	2
) 5	All intermediate results should be rounderror formula $E = \frac{1}{2}(actual - prediction)$ Consider the following transactions: Transaction T ₁	$b_5 = 0.2$ Ided upto two decimal places. Use learning rate=0.9 at each 0.5 . In above figure, take $W_{34} = -0.5$, $W_{35} = 0.5$. Items A_{11} , A_{12} , A_{13}	2
) 5	All intermediate results should be rounderror formula $E = \frac{1}{2}(actual - prediction)$ Consider the following transactions: Transaction T_1 T_2	$b_5 = 0.2$ Ided upto two decimal places. Use learning rate=0.9 at each 0.5 . In above figure, take $W_{34} = -0.5$, $W_{35} = 0.5$. Items I ₁ , I ₂ , I ₃ I ₂ , I ₃ , I ₄	2
) 5	All intermediate results should be rounderror formula $E = \frac{1}{2}(actual - prediction)$ Consider the following transactions: Transaction T1 T2 T3	$b_5 = 0.2$ Ided upto two decimal places. Use learning rate=0.9 at ted) ² . In above figure, take $W_{34} = -0.5$, $W_{35} = 0.5$ Items I ₁ , I ₂ , I ₃ I ₂ , I ₃ , I ₄ I ₄ , I ₅	2