INTRODUCTION TO ARTIFICIAL INTELLIGENCE
Lab 5 – Decision Aiding – ELECTRE I

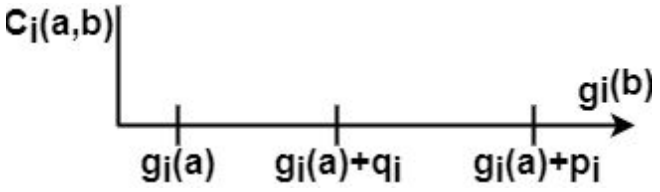
1) **RELATIONAL MODEL:** Determine the relation between given pairs of alternatives for the following outranking matrix.

OUTRANKING MATRIX

S	a	b	c	d
a	1	0	1	0
b	1	1	1	1
c	1	0	1	0
d	0	0	0	1

RELATION

a	a
a	b
a	c
a	d
b	a
b	b
b	c
b	d



2) **CONCORDANCE & DISCORDANCE:** Calculate concordance and discordance indexes for all pairs of alternatives. The criteria are of a gain-type. Assume that the cutting level equals 0.85. For which pairs a S b is fulfilled? Complete the outranking matrix.

WEIGHTS & THRESHOLDS FOR CRITERIA

	Weather	Cost	Food
q	0.1	0.1	0.1
p	0.2	0.25	0.3
v	0.3	0.4	1.0
w	0.5	0.2	0.3

PERFORMANCE MATRIX

	Weather	Cost	Food
Germany	0.7	0.7	0.5
Italy	0.9	0.5	0.8
Norway	0.6	0.2	0.7
Spain	0.9	0.4	0.6

COMPREHENSIVE CONCORDANCE

C(a, b)	G	I	N	S
G	-			
I	0.86	-	1	1
N	0.8	0.3	-	0.36
S	0.8	0.85	1	-

$C_{Weather}(G,I) =$ $C_{Weather}(G,N) =$ $C_{Weather}(G,S) =$

$C_{Cost}(G,I) =$ $C_{Cost}(G,N) =$ $C_{Cost}(G,S) =$

$C_{Food}(G,I) =$ $C_{Food}(G,N) =$ $C_{Food}(G,S) =$

$C(G,I) =$ $C(G,N) =$ $C(G,S) =$

COMPREHENSIVE DISCORDANCE

D(a, b)	G	I	N	S
G	-	0	0	0
I		-	0	0
N		1	-	1
S		0	0	-

OUTRANKING MATRIX

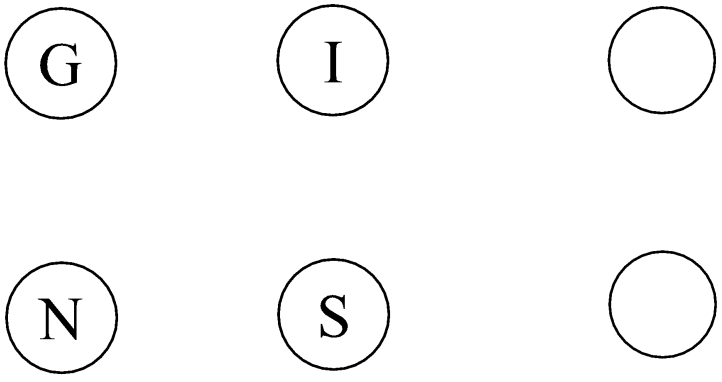
a S b	G	I	N	S
G	-			
I		-		
N			-	
S				-

3) **OUTRANKING GRAPH:** Draw outranking graph, remove cycles, and find the graph kernel.

Outranking graph:

After the elimination of cycles:

X =



Graph kernel: