Problem 9.16 / 1.23

PROBLEM STATEMENT

A legal firm has accepted five new cases, each of which can be handled adequately by any one of its five junior partners. Due to differences in experience and expertise, however, the junior partners would spend varying amounts of time on the cases. A senior partner has estimated the time requirements (in hours) as shown below:

	Case 1	Case 2	Case 3	Case 4	Case 5
Lawyer 1	145	122	130	95	115
Lawyer 2	80	63	85	48	78
Lawyer 3	121	107	93	69	95
Lawyer 4	118	83	116	80	105
Lawyer 5	97	75	120	80	111

SOLUTION TEMPLATE

	Case 1	Case 2	Case 3	Case 4	Case 5
Lawyer 1					
Lawyer 2					
Lawyer 3					
Lawyer 4					
Lawyer 5					

SOLUTION BY THE HUNGARIAN METHOD

1. Step 1

(a) In each row, subtract the smallest value in the row from each entry in the row.

	Case 1	Case 2	Case 3	Case 4	Case 5
Lawyer 1	50	27	35	0	20
Lawyer 2	32	15	37	0	30
Lawyer 3	52	38	24	0	26
Lawyer 4	38	3	36	0	25
Lawyer 5	22	0	45	5	36

(b) In each column, subtract the smallest value in the column from each entry in the column.

	Case 1	Case 2	Case 3	Case 4	Case 5
Lawyer 1	28	27	11	0	0
Lawyer 2	10	15	13	0	0
Lawyer 3	30	38	0	0	6
Lawyer 4	16	[3]	12	0	5
Lawyer 5	0	0	21	5	16

2. Step 2: Look for a feasible assignment consisting of zeros - exactly one zero in each row and exactly one zero in each column. If there is such an assignment, it's the optimal assignment. Otherwise, go to Step 3.

3. Step 3: Cover all the zeros in the revised cost matrix with as few horizontal and vertical lines as possible. Locate the smallest number not covered by a line. Subtract that number from each entry not covered by a line, and add that number to each entry covered by two lines.

	Case 1	Case 2	Case 3	Case 4	Case 5
Lawyer 1	25	24	8	0	$\boxed{0}$
Lawyer 2	7	12	10	$\boxed{0}$	10
Lawyer 3	30	38	$\boxed{0}$	3	9
Lawyer 4	13	$\boxed{0}$	9	0	5
Lawyer 5	$\boxed{0}$	0	21	8	19

4. Step 4: Return to Step 2.