

Square Puzzle

Input file: **standard input**
 Output file: **standard output**
 Time limit: **3 seconds**
 Memory limit: **1024 megabytes**

Consider a grid with 3 rows and 3 columns. Each cell of the grid has an integer in it. Each integer from 1 to 9 (both inclusive) appears exactly once in the grid.

You can perform the following three types of operations on the grid.

Operation	Description	Example																		
Right-shift one row	Choose one row and move its right-most element to the left-most position.	<p>Right-shift the third row</p> <table style="display: inline-table; border-collapse: collapse;"> <tr><td style="border: 1px solid black; padding: 2px 10px;">2</td><td style="border: 1px solid black; padding: 2px 10px;">9</td><td style="border: 1px solid black; padding: 2px 10px;">3</td></tr> <tr><td style="border: 1px solid black; padding: 2px 10px;">6</td><td style="border: 1px solid black; padding: 2px 10px;">7</td><td style="border: 1px solid black; padding: 2px 10px;">8</td></tr> <tr><td style="border: 1px solid black; padding: 2px 10px;">5</td><td style="border: 1px solid black; padding: 2px 10px;">1</td><td style="border: 1px solid black; padding: 2px 10px;">4</td></tr> </table> → <table style="display: inline-table; border-collapse: collapse;"> <tr><td style="border: 1px solid black; padding: 2px 10px;">2</td><td style="border: 1px solid black; padding: 2px 10px;">9</td><td style="border: 1px solid black; padding: 2px 10px;">3</td></tr> <tr><td style="border: 1px solid black; padding: 2px 10px;">6</td><td style="border: 1px solid black; padding: 2px 10px;">7</td><td style="border: 1px solid black; padding: 2px 10px;">8</td></tr> <tr><td style="border: 1px solid black; padding: 2px 10px;">4</td><td style="border: 1px solid black; padding: 2px 10px;">5</td><td style="border: 1px solid black; padding: 2px 10px;">1</td></tr> </table>	2	9	3	6	7	8	5	1	4	2	9	3	6	7	8	4	5	1
2	9	3																		
6	7	8																		
5	1	4																		
2	9	3																		
6	7	8																		
4	5	1																		
Down-shift one column	Choose one column and move its bottom-most element to the top-most position.	<p>Down-shift the first column</p> <table style="display: inline-table; border-collapse: collapse;"> <tr><td style="border: 1px solid black; padding: 2px 10px;">2</td><td style="border: 1px solid black; padding: 2px 10px;">5</td><td style="border: 1px solid black; padding: 2px 10px;">7</td></tr> <tr><td style="border: 1px solid black; padding: 2px 10px;">4</td><td style="border: 1px solid black; padding: 2px 10px;">9</td><td style="border: 1px solid black; padding: 2px 10px;">1</td></tr> <tr><td style="border: 1px solid black; padding: 2px 10px;">8</td><td style="border: 1px solid black; padding: 2px 10px;">6</td><td style="border: 1px solid black; padding: 2px 10px;">3</td></tr> </table> → <table style="display: inline-table; border-collapse: collapse;"> <tr><td style="border: 1px solid black; padding: 2px 10px;">8</td><td style="border: 1px solid black; padding: 2px 10px;">5</td><td style="border: 1px solid black; padding: 2px 10px;">7</td></tr> <tr><td style="border: 1px solid black; padding: 2px 10px;">2</td><td style="border: 1px solid black; padding: 2px 10px;">9</td><td style="border: 1px solid black; padding: 2px 10px;">1</td></tr> <tr><td style="border: 1px solid black; padding: 2px 10px;">4</td><td style="border: 1px solid black; padding: 2px 10px;">6</td><td style="border: 1px solid black; padding: 2px 10px;">3</td></tr> </table>	2	5	7	4	9	1	8	6	3	8	5	7	2	9	1	4	6	3
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Rotate clockwise	Rotate the whole grid 90 degrees clockwise.	<p>Rotate clockwise</p> <table style="display: inline-table; border-collapse: collapse;"> <tr><td style="border: 1px solid black; padding: 2px 10px;">5</td><td style="border: 1px solid black; padding: 2px 10px;">7</td><td style="border: 1px solid black; padding: 2px 10px;">3</td></tr> <tr><td style="border: 1px solid black; padding: 2px 10px;">1</td><td style="border: 1px solid black; padding: 2px 10px;">4</td><td style="border: 1px solid black; padding: 2px 10px;">9</td></tr> <tr><td style="border: 1px solid black; padding: 2px 10px;">8</td><td style="border: 1px solid black; padding: 2px 10px;">2</td><td style="border: 1px solid black; padding: 2px 10px;">6</td></tr> </table> → <table style="display: inline-table; border-collapse: collapse;"> <tr><td style="border: 1px solid black; padding: 2px 10px;">8</td><td style="border: 1px solid black; padding: 2px 10px;">1</td><td style="border: 1px solid black; padding: 2px 10px;">5</td></tr> <tr><td style="border: 1px solid black; padding: 2px 10px;">2</td><td style="border: 1px solid black; padding: 2px 10px;">4</td><td style="border: 1px solid black; padding: 2px 10px;">7</td></tr> <tr><td style="border: 1px solid black; padding: 2px 10px;">6</td><td style="border: 1px solid black; padding: 2px 10px;">9</td><td style="border: 1px solid black; padding: 2px 10px;">3</td></tr> </table>	5	7	3	1	4	9	8	2	6	8	1	5	2	4	7	6	9	3
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6	9	3																		

Given two such grids, calculate the minimum number of operations needed to transform the first grid to the second one.

Input

There are multiple test cases. The first line of the input contains an integer T ($1 \leq T \leq 2 \times 10^5$), indicating the number of test cases. For each test case:

For the first three lines, the i -th line contains a string $a_{i,1}a_{i,2}a_{i,3}$ ($1 \leq a_{i,j} \leq 9$), indicating the i -th line of the first grid.

For the following three lines, the i -th line contains a string $b_{i,1}b_{i,2}b_{i,3}$ ($1 \leq b_{i,j} \leq 9$), indicating the i -th line of the second grid.

Output

For each test case output one line. If it is possible to transform the first grid to the second one, output an integer indicating the minimum number of operations needed; If it is impossible to do so, output -1 instead.

Example

standard input	standard output
4	3
293	5
678	-1
514	0
624	
579	
183	
624	
579	
183	
293	
678	
514	
123	
456	
789	
321	
456	
789	
123	
456	
789	
123	
456	
789	

Note

For the first sample test case, as shown in the description, we can first right-shift the third row, then down-shift the first column, and finally rotate clockwise.