

Examples of functions which preserve T - S -semi-transitivity are the same as for T - S -Ferrers property.

Example 12. Conditions given in Theorems 11 and 12 are only the sufficient ones. Let us consider function $F(s, t) = st$ (so $F = T_P$) and fuzzy relations presented by the matrices

$$R_1 = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}, \quad R_2 = \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}.$$

Relations R_1, R_2 are min-max-Ferrers ([9], p. 142) and min-max-semi-transitive, and $R = F(R_1, R_2)$ is both min-max-Ferrers and min-max-semi-transitive, where $R \equiv 0$. However, it is not true that $F \gg \min$ (the only t -norm that dominates minimum is minimum itself, see Theorem 3).

4. Conclusion

In this contribution we presented the necessary and sufficient conditions for the preservation of fuzzy relation properties. The considered properties involve triangular norms T and triangular conorms S . In the case of T - S -Ferrers property and T - S -semi-transitivity only the sufficient conditions were obtained, but suitable counter-examples showing that the necessity does not hold were provided.

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