



transpose operator

Canonical name	TransposeOperator
Date of creation	2013-03-22 17:34:19
Last modified on	2013-03-22 17:34:19
Owner	asteroid (17536)
Last modified by	asteroid (17536)
Numerical id	5
Author	asteroid (17536)
Entry type	Definition
Classification	msc 47A05
Classification	msc 46-00
Synonym	conjugate operator
Related topic	Transpose
Related topic	Adjoint5

Let X, Y be normed vector spaces and X', Y' be their continuous dual spaces.

- Let $T : X \longrightarrow Y$ be a bounded linear operator. The operator $T' : Y' \longrightarrow X'$ given by

$$T'\phi = \phi \circ T, \quad \phi \in Y'$$

is called the **transpose operator** of T or the **conjugate operator** of T .

It is clear that T' is well defined, i.e. $\phi \circ T \in X'$, since the composition of two continuous linear operators is again a continuous linear operator.

Moreover, it can be easily checked that T' is a bounded linear operator.

Remarks -

- When the vector spaces are finite dimensional, the transpose operator corresponds to <http://planetmath.org/Transposetransposing> the matrix associated to it.
- For Hilbert spaces, a somewhat similar definition is that of adjoint operator. But this two notions do not coincide: while the transpose operator corresponds to the transpose of a matrix, the adjoint operator corresponds to the conjugate transpose of a matrix.