# 1 | Axler7.8 conjugate transpose def

The *conjugate transpose* of an $m$-by-$n$ matrix is the $n$-by-$m$ matrix obtained by taking the transpose then the complex conjugate of each entry.

If $\mathbb{F} = \mathbb{R}$ then the conjugate transpose is just the transpose.

# 2 | Axler7.10 The matrix of $T^*$ (adjoint)

Let $T \in \mathcal{L}(V, W)$. Suppose $e_1, \ldots, e_n$ is an orthonormal basis of $V$ and $f_1, \ldots, f_m$ is an orthonormal basis of $W$. Then,

$$\mathcal{M}(T^*, (f_1, \ldots, f_m), (e_1, \ldots, e_n))$$

is the *conjugate transpose* of

$$\mathcal{M}(T, (e_1, \ldots, e_n), (f_1, \ldots, f_m))$$

However, since **this only works with orthonormal bases**, Axler decided to focus on adjoints instead of conjugate transposes. (but they are the same thing under orthonormal bases).