Why

It happens that all circulant matrices have the same eigenvectors.

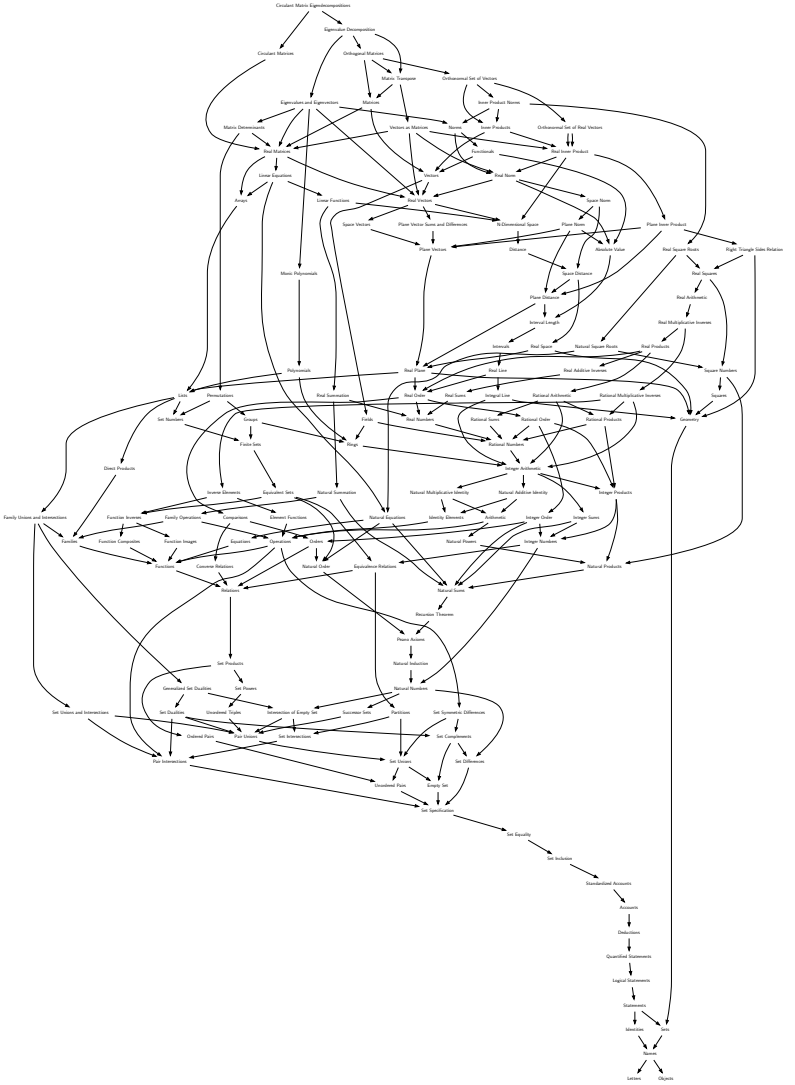
Definition

Recall that C is circulant then

$$C = c_0 I + c_1 S + c_2 S^2 + \cdots + c_{n-1} S^{n-1}.$$

So $q \in \mathbf{R}^d$ is an eigenvector of C if and only if it is one of S.[1]

[1] Future editions will complete this development.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