

**Source:**

## 1 | **Algebraic and Geometric Multiplicities**

I missed the last ten minutes of class and had to look up what the algebraic and geometric multiplicities are. I used this source.

Also it says something about

It is a fact that summing up the algebraic multiplicities of all the eigenvalues of an  $n \times n$  matrix  $A$  gives exactly  $n$ .

Which reminds me of the fundamental theorem of algebra...

$$1.1 \mid \begin{pmatrix} 4 & -12 \\ 2 & 0 \end{pmatrix}$$

### 1.1.1 | **Geometric multiplicity**

The null space is span  $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$  which is dimension 1.

### 1.1.2 | **Algebraic multiplicity**

The determinant of  $\begin{pmatrix} 2 & -2 \\ 2 & -2 \end{pmatrix}$  is

$$-2(4 - \lambda) - 2(-\lambda) = 4(\lambda - 1)$$

So the algebraic multiplicity is 1?

$$1.2 \mid \begin{pmatrix} 1 & 1 & 2 \\ 0 & 1 & -1 \\ 0 & 0 & 3 \end{pmatrix}$$