Source:

1 | Algebreic and Geometric Multiplicities

I missed the last ten minutes of class and had to look up what the algebreic 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 | $\begin{pmatrix} 4 & -12 \\ 2 & 0 \end{pmatrix}$

1.1.1 | Geometric multiplicity

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

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 $\boxed{1}$?

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

1.2.1 | Geometric

Null space $(x, 0, 0)$ has dim 1.

1.2.2 | Algebraic