MA 16020 Lesson 36: Eigenvalues and eigenvectors II

Recall: The **eigenvector** of a square $(n \times n)$ matrix A is a vector $v \neq 0$ such that:

for some number λ, which is then called an **eigenvalue** of A. To find them, we set up and solve the *characteristic equation*:

Eigenvalues of A are obtained as _____. Given an eigenvalue λ, the corresponding eigenvectors are obtained as:

Recall: long division of polynomials.

Example: Find all the solutions to the equation

$$x^3 - 7x^2 + 12x - 6 = 0.$$

Example: Find the eigenvalues and eigenvectors for the matrix $\begin{bmatrix} -1 & 0 & -2 \\ -12 & -1 & -12 \\ 4 & 0 & 5 \end{bmatrix}$.

Example: Find the eigenvalues and eigenvectors for the matrix $\begin{bmatrix} 3 & -1 & 4 \\ 2 & 3 & 8 \\ -1 & 0 & -2 \end{bmatrix}$.