the characteristic polynomial: a shortcut

Recall the trace of the square matrix: Let A be an $n \times n$ matrix. The trace of A, denoted $tr(A)$, is the sum of the diagonal elements of A. That is,

$$tr(A) = a_{11} + a_{22} + \cdots + a_{nn}$$

The characteristic polynomial for a 2×2 matrix

Let A be a 2×2 matrix. All coefficients of the characteristic polynomial can be found via

$$f(\lambda) = \lambda^2 + tr(A)\lambda + \det(A)$$

this is generally the fastest way to compute the characteristic polynomial of a 2×2 matrix.

example cont'd

$$A = \begin{bmatrix} 5 & 2 \\ 2 & 1 \end{bmatrix} \quad \Longrightarrow \quad f(\lambda) = \lambda^2 - tr(A)\lambda + \det(A) = \lambda^2 - 6\lambda + 1$$

the process so far...