Quiz 14 Solution
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1. Find all real eigenvalues of the matrix

$$A = \begin{pmatrix} 4 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 2 & 2 \end{pmatrix}.$$

The matrix is in block diagonal form with blocks $B = (4)$ and $C = \begin{pmatrix} 1 & 1 \\ 2 & 2 \end{pmatrix}$. To find the eigenvalues of C, compute

$$\det \begin{pmatrix} 1-t & 1 \\ 2 & 2-t \end{pmatrix} = (1-t)(2-t) - 2 = t^2 - 3t = t(t-3).$$

This tells us that the eigenvalues of C are 0 and 3, so the eigenvalues of A are 0, 3 and 4.