Math 415 ADG **Name:** Solution

Quiz # 9

April 18, 2014

No notes, electronic devices, or interpersonal communication allowed. **Show work to get credit.** Use the methods from this class.

Find the eigenvalues and (bases for) the corresponding eigenspaces of the matrix $\underbrace{\begin{bmatrix} 1 & 1 \\ -2 & 4 \end{bmatrix}}_{A}$.

$$\det(A-\lambda I) = \det\begin{pmatrix} 1-\lambda & 1 \\ -2 & 4-\lambda \end{pmatrix}$$

$$= (1-\lambda)(4-\lambda) + 2 = \lambda^2 - 5\lambda + 6 = (\lambda-2)(\lambda-3)$$

So e'vals are 2 & 3.

$$E_2 = \mathrm{Nul}(A-2I) = \mathrm{Nul}\begin{pmatrix} -1 & 1 \\ -2 & 2 \end{pmatrix} \overset{R_2=2R_1}{=} \mathrm{Nul}\begin{pmatrix} -1 & 1 \\ 0 & 0 \end{pmatrix} = \mathrm{Span}\left\{\begin{bmatrix} 1 \\ 1 \end{bmatrix}\right\}$$

$$E_3 = \mathrm{Nul}(A-3I) = \mathrm{Nul}\begin{pmatrix} -2 & 1 \\ -2 & 1 \end{pmatrix} \overset{R_2=-R_1}{=} \mathrm{Nul}\begin{pmatrix} -2 & 1 \\ 0 & 0 \end{pmatrix} = \mathrm{Span}\left\{\begin{bmatrix} 1 \\ 2 \end{bmatrix}\right\}$$

> bases