$$A = \begin{vmatrix} 1 & -4 & 3 \\ 1 & -1 & 1 \\ -3 & 12 & -9 \end{vmatrix}$$

Pivot

$$= \begin{vmatrix} -3 & 12 & -9 \\ 1 & -1 & 1 \\ 1 & -4 & 3 \end{vmatrix} \qquad P = \begin{vmatrix} 3 \\ 2 \\ 1 \end{vmatrix} \qquad P = \begin{vmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{vmatrix}$$

$$U = \begin{vmatrix} -3 & 12 & -9 \\ 0 & 3 & -2 \\ 0 & 0 & 0 \end{vmatrix} \qquad L = \begin{vmatrix} 1 & 0 & 0 \\ -1/3 & 1 & 0 \\ -1/3 & 0 & 1 \end{vmatrix}$$

$$PA = \begin{vmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{vmatrix} \begin{vmatrix} 1 & -4 & 3 \\ 1 & -1 & 1 \\ -3 & 12 & -9 \end{vmatrix} = \begin{vmatrix} -3 & 12 & -9 \\ 1 & -1 & 1 \\ 1 & -4 & 3 \end{vmatrix} \Rightarrow PA = LU$$

$$LU = \begin{vmatrix} 1 & 0 & 0 \\ -1/3 & 1 & 0 \\ -1/3 & 0 & 1 \end{vmatrix} \begin{vmatrix} -3 & 12 & -9 \\ 0 & 3 & -2 \\ 0 & 0 & 0 \end{vmatrix} = \begin{vmatrix} -3 & 12 & -9 \\ 1 & -1 & 1 \\ 1 & -4 & 3 \end{vmatrix}$$

$$\lambda I = \lambda \begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} = \begin{vmatrix} \lambda & 0 & 0 \\ 0 & \lambda & 0 \\ 0 & 0 & \lambda \end{vmatrix}$$

$$A - \lambda I = \begin{vmatrix} 1-\lambda & -4 & 3 \\ 1 & -1-\lambda & 1 \\ -3 & 12 & -9-\lambda \end{vmatrix}$$

$$\det(A-\lambda I) = (1-\lambda)\left((-1-\lambda)(-9-\lambda) - (12)\right) + 4\left((-9-\lambda) + 3\right) + 3\left(12 + 3(-1-\lambda)\right)$$

$$= (1-\lambda)(9 + 9\lambda + \lambda + \lambda^2 - 12) + 24 - 4\lambda + 36 - 9 - 9\lambda$$

$$= (1-\lambda)(\lambda^2 + 10\lambda - 3) + -13\lambda + 39$$

$$= \lambda^2 + 10\lambda - 3 + -\lambda^3 - 10\lambda^2 + 3\lambda - 13\lambda + 39$$

$$= -\lambda^3 - 9\lambda^2 = 0$$

$$\lambda = 0 \quad \lambda = 0 \quad \lambda = 9$$

Eigenvalues not the same as diagonal of U