1 - (c) $C = \begin{pmatrix} -2 & -8 \\ 1 & 2 \end{pmatrix}$

Per a calcular els valors propis de C calculem:

$$|C-\lambda I| = \begin{vmatrix} -2-\lambda & -8 \\ 1 & 2-\lambda \end{vmatrix} = (-2-\lambda)(2-\lambda)+8 = \lambda^2-4+8 =$$

$$= \lambda^2+4 \overset{?}{=} 0 \Leftrightarrow \lambda^2 = -4$$ No té arrels reals.

(e) $E = \begin{pmatrix} -2 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{pmatrix}$

Com que E és triangular els valors propis són els elements de la diagonal principal: $\boxed{\begin{matrix} \lambda = -2 \text{ simple} \\ \lambda = 1 \text{ doble.} \end{matrix}}$

Calculem ara els subespais propis:

$\boxed{\lambda=-2}$ $Nuc(E+2I)$ $E+2I = \begin{pmatrix} 0 & 0 & 0 \\ 1 & 3 & 0 \\ 1 & 1 & 3 \end{pmatrix}$ $\left(\begin{array}{ccc|c} 0 & 0 & 0 & 0 \\ 1 & 3 & 0 & 0 \\ 1 & 1 & 3 & 0 \end{array}\right)$

$$\left(\begin{array}{ccc|c} 0 & 0 & 0 & 0 \\ 1 & 3 & 0 & 0 \\ 1 & 1 & 3 & 0 \end{array}\right) \xrightarrow{E_{3,2}^{(-1)}} \left(\begin{array}{ccc|c} 0 & 0 & 0 & 0 \\ 1 & 3 & 0 & 0 \\ 0 & -2 & 3 & 0 \end{array}\right)$$

$z = \lambda$

$2y = 3\lambda \rightarrow y = \frac{3\lambda}{2}$

$x = -3y = -\frac{9\lambda}{2}$

$(x,y,z) = \left(\frac{-9\lambda}{2}, \frac{3\lambda}{2}, \lambda\right) = \lambda\left(\frac{-9}{2}, \frac{3}{2}, 1\right)$

Per tant $\boxed{Nuc(E+2I) = \langle(-\tfrac{9}{2}, \tfrac{3}{2}, 1)\rangle = \langle(-9, 3, 2)\rangle}$

$\boxed{\lambda = 1}$ $Nuc(E-I) = \begin{pmatrix} -3 & 0 & 0 \\ 1 & 0 & 0 \\ 1 & 1 & 0 \end{pmatrix}$ $\left(\begin{array}{ccc|c} -3 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 \end{array}\right) \rightarrow \begin{matrix} x = 0 \\ y = 0 \\ z = \lambda \end{matrix}$

$(0,0,\lambda) = \lambda(0,0,1)$. Per tant $\boxed{Nuc(E-I) = \langle(0,0,1)\rangle}$