Elimination Followed by Anti-elimination

Quiz: Elimination converts the system

$$\begin{aligned}
\dot{x} &= 6x + 5y \\
\dot{y} &= x + 2y
\end{aligned}$$

to the ODE $\ddot{x} - 8\dot{x} + 7x = 0$.

What is the coefficient matrix of the system that anti-elimination converts it back to?

Choices:

a. $\begin{pmatrix} 1 & 2 \\ 6 & 5 \end{pmatrix}$

b. $\begin{pmatrix} 6 & 5 \\ 1 & 2 \end{pmatrix}$

c. $\begin{pmatrix} 0 & 1 \\ -7 & 8 \end{pmatrix}$

d. None of these.

Answer: (c) $\begin{pmatrix} 0 & 1 \\ -7 & 8 \end{pmatrix}$.

Note that neither a. nor b. has the form of a companion matrix.

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