6. Consider the system with parameter h

$$\mathbf{x}' = \begin{pmatrix} -3 & 1 \\ -1 & h \end{pmatrix} \mathbf{x}$$

for a vector function $\mathbf{x} = \mathbf{x}(t)$.

(a) (4 points) For which value(s) of h is there a solution of this system of the form

$$\mathbf{x}(t) = \begin{pmatrix} (at+b)\mathrm{e}^{-4t} \\ (t+c)\mathrm{e}^{-4t} \end{pmatrix}$$

for some constants a, b, c? (No need to find a, b, c, just h.)

(b) (4 points) Suppose that $h = -3$. Solve the initial-value problem for the system with initial condition

$$\mathbf{x}(0) = \begin{pmatrix} 1 \\ 1 \end{pmatrix}.$$