

1. Find the general solution using variation of parameters:

a.

$$\mathbf{x}' = \begin{pmatrix} -1 & -1 \\ 0 & 1 \end{pmatrix} \mathbf{x} + \begin{pmatrix} 18 \\ 3t \end{pmatrix}$$

Note: A fundamental set of solutions to the homogeneous problem is:

$$\mathbf{x}_1(t) = e^{-2t} \begin{pmatrix} 1 \\ 1 \end{pmatrix}, \quad \mathbf{x}_2(t) = e^{-4t} \begin{pmatrix} 1 \\ -1 \end{pmatrix}$$

b. $y'' + 2y' + y = 3e^{-t}$

c. $y'' + y = \tan t, \quad 0 < t < \pi/2$