

**MATH 365: HONORS ANALYSIS I  
LINEAR SYSTEMS EXERCISES**

Find the general solution to the given system of equations.

$$(1) \mathbf{X}' = \begin{pmatrix} 3 & -2 \\ 2 & -2 \end{pmatrix} \mathbf{X}$$

$$(2) \mathbf{X}' = \begin{pmatrix} -2 & 1 \\ 1 & -2 \end{pmatrix} \mathbf{X}$$

$$(3) \mathbf{X}' = \begin{pmatrix} 2 & -5 \\ 1 & -2 \end{pmatrix} \mathbf{X}$$

$$(4) \mathbf{X}' = \begin{pmatrix} 3 & -2 \\ 4 & -1 \end{pmatrix} \mathbf{X}$$

$$(5) \mathbf{X}' = \begin{pmatrix} 4 & -2 \\ 8 & -4 \end{pmatrix} \mathbf{X}$$

$$(6) \mathbf{X}' = \begin{pmatrix} 1 & -4 \\ 4 & -7 \end{pmatrix} \mathbf{X}$$

$$(7) \mathbf{X}' = \begin{pmatrix} 1 & \sqrt{3} \\ \sqrt{3} & -1 \end{pmatrix} \mathbf{X} + \begin{pmatrix} e^t \\ \sqrt{3}e^{-t} \end{pmatrix}$$

$$(8) \mathbf{X}' = \begin{pmatrix} 2 & -5 \\ 1 & -2 \end{pmatrix} \mathbf{X} + \begin{pmatrix} -\cos(t) \\ \sin(t) \end{pmatrix}$$