Linear ODE with Constant Coefficients

1. Solve the linear ordinary differential equations with constant coefficients

$$\frac{d\vec{v}}{dt} = A \cdot \vec{v}$$

for each of the following matrices A by calculating $\exp(tA)$.

(a) $A = \begin{pmatrix} 0 & -1 \\ 1 & 1 \end{pmatrix}$

(b) $A = \begin{pmatrix} 1 & -1 \\ 1 & 1 \end{pmatrix}$

(c) $A = \begin{pmatrix} 1 & -1 \\ 1 & -1 \end{pmatrix}$

(d) $A = \begin{pmatrix} 0 & 1 \\ 1 & -1 \end{pmatrix}$

(e) $A = \begin{pmatrix} 0 & 1 \\ 1 & 1 \end{pmatrix}$