Online Math 3321

Alternate 7

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Please submit your answers using the EMCF alternate07 on CourseWare.

(1) Find the eigenvalues of $\begin{pmatrix} 2 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 2 \end{pmatrix}$.

(a) $1, 2$.

(b) $1, 3$.

(c) $0, -3, 1$.

(d) $0, 2, 1$.

(e) None of these.

(2) Find the eigenvalues and corresponding eigenvectors of $\begin{pmatrix} 3 & -1 \\ 1 & 1 \end{pmatrix}$.

(a) Only eigenvalue is 1 and corresponding eigenvector is nonzero scalar multiple of $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$.

(b) Only eigenvalue is 0 and corresponding eigenvector is nonzero scalar multiple of $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$.

(c) Only eigenvalue is 2 and corresponding eigenvector is nonzero scalar multiple of $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$.

(d) Eigenvalues are $1, 0$ and corresponding eigenvectors are nonzero scalar multiple of $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$, $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$ respectively.

(e) None of these.

(3) Solve the initial value problem for y

$$\begin{aligned} x' =& x + 2y \\ y' =& 2x + y \\ x(0) =& 1, y(0) = -3. \end{aligned}$$

(a) $y = -2e^{2t} - e^{3t}$.

(b) $y = -2e^{t} - e^{3t}$.

(c) $y = -2e^{-t} - e^{3t}$.

(d) $y = -2e^{2t} - e^{t}$.

(e) None of these.

(4) Solve the initial value problem for x

$$\begin{aligned} x' =& 3x + y \\ y' =& -2x \\ x(0) =& 1, y(0) = 1. \end{aligned}$$

(a) $x = -2e^{t} + 3e^{-t}$.

(b) $x = e^{t} - 3e^{3t}$.

(c) $x = e^{t} - 3e^{2t}$.

(d) $x = -2e^{t} + 3e^{2t}$.

(e) None of these.

(5) Solve the initial value problem for y

$$\begin{aligned} x' =& x + 3y \\ y' =& 2x + 2y \\ x(0) =& 1, y(0) = -1 \end{aligned}$$

(a) $y = \frac{1}{5}e^{4t} + \frac{4}{5}e^{-t}$.

(b) $y = \frac{-1}{5}e^{4t} - \frac{4}{5}e^{-t}$.

(c) $y = \frac{-1}{2}e^{t} - e^{2t}$.

(d) $y = e^{4t} + \frac{2}{3}e^{t}$.

(e) None of these.