PRINTABLE VERSION

Quiz 13

You scored 75 out of 100

Question 1

Your answer is CORRECT.

For what values of *a* does the system below have nontrivial solutions?

$$\begin{bmatrix} -3x-2y-z=0 \\ -12x+ay-4z=0 \\ 2x-3y+2z=0 \end{bmatrix}$$

a) 4

b) -2

c) 8

d) -8

e) -4

f) None of the above.

Question 2

Your answer is CORRECT.

Given:

$$A=\begin{bmatrix} 4 & -5 \\ -1 & 3 \\ -5 & -5 \end{bmatrix} \quad B=\begin{bmatrix} -3 & 3 \\ 3 & 5 \\ 5 & 3 \end{bmatrix} \quad C=\begin{bmatrix} 0 & 2 \\ 2 & 3 \end{bmatrix} \quad D=\begin{bmatrix} 6 & 5 \\ 2 & -5 \end{bmatrix}$$

Compute 4*A* - 2*BC*.

a) *Not possible.*

b) $\begin{bmatrix} 4 & -26 \\ -24 & -30 \\ -32 & -58 \end{bmatrix}$

c) ○ $\begin{bmatrix} 1 & -2 \\ 3 & 2 \\ 4 & 6 \end{bmatrix}$

d) ○ $\begin{bmatrix} 3 & -27 \\ -25 & -30 \\ -33 & -59 \end{bmatrix}$

e) ○ $\begin{bmatrix} 1 & -3 \\ -9 & -10 \end{bmatrix}$

f) ○ None of the above.

Question 3

Your answer is CORRECT.

The matrices A, B and C are given by

$$A=\begin{bmatrix} 3 & -2 & 1 \\ 2 & -2 & -1 \\ 0 & 0 & 2 \end{bmatrix} \quad B=\begin{bmatrix} 0 & -4 & 3 \\ 0 & -3 & -3 \\ -1 & 3 & -2 \end{bmatrix} \quad C=\begin{bmatrix} 4 & -3 & 3 \\ 4 & -4 & 1 \\ 2 & 2 & -2 \end{bmatrix}$$

and D = 2A - 4C. Give the value of $d_{2,1}$.

a) ○ -11

b) ○ 5

c) ○ 6

d) ○ -15

e) ○ 8

f) ◉ None of the above.

Question 4

Your answer is CORRECT.

Let

$$A=\begin{bmatrix} 5 & 2 & -1 \\ -3 & 1 & 2 \\ 2 & 0 & -1 \end{bmatrix}$$

Find A^{-1}, if it exists.

a) $\begin{bmatrix} 3 & -2 & -4 \\ -1 & 3 & 9 \\ 3 & -3 & -9 \end{bmatrix}$

b) $\begin{bmatrix} 0 & -4 & -4 \\ -2 & 4 & 5 \\ 2 & -5 & -12 \end{bmatrix}$

c) *A does not have an inverse.*

d) $\begin{bmatrix} 3 & -3 & -7 \\ 0 & 3 & 6 \\ 0 & -4 & -10 \end{bmatrix}$

e) $\begin{bmatrix} 1 & -2 & -5 \\ -1 & 3 & 7 \\ 2 & -4 & -11 \end{bmatrix}$

f) None of the above.

Question 5

Your answer is CORRECT.

Use Cramer's rule to give the solution set to the system of equations

$$\begin{bmatrix} x + 3y + z = -1 \\ -5x - 4y - 3z = -2 \\ -2x - y - z = 1 \end{bmatrix}$$

a) *The system does not have a solution.*

b) $[x = -10, y = -7, z = 24]$

c) $[x = -5, y = -10, z = 26]$

d) $[x = -10, y = -10, z = 25]$

e) $[x = -7, y = -10, z = 24]$

f) None of the above.

Question 6

Your answer is CORRECT.

Give the value(s) of *a* for which the columns in the matrix

$$A = \begin{bmatrix} 13 & 3 & 15+a \\ 3 & 18 & 0 \\ 15+a & 0 & 18 \end{bmatrix}$$

are linearly dependent.

a) $\{-27, 3\}$

b) $\{-30, 0\}$

c) $\{-32, 1\}$

d) $\{-31, -3\}$

e) $\{-27, 2\}$

f) None of the above.

Question 7

Your answer is CORRECT.

Find the eigenvalues and number of independent eigenvectors. (Hint: -2 is an eigenvalue.)

$$\begin{bmatrix} 0 & -2 & 1 \\ 2 & -5 & 2 \\ 2 & -3 & 0 \end{bmatrix}$$

a) Eigenvalues: -2, -2, -1; Number of independent eigenvectors: 2

b) Eigenvalues: -2, -1, -1; Number of independent eigenvectors: 3

c) Eigenvalues: -2, 2, -1; Number of independent eigenvectors: 3

d) Eigenvalues: 2, 2, -1; Number of independent eigenvectors: 2

e) Eigenvalues: -2, -1, 1; Number of independent eigenvectors: 3

f) None of the above.

Question 8

Your answer is CORRECT.

Which of the following is a solution to **x** ' = *A*(*t*) **x** + **b** (*t*) if

$$A(t) = \begin{bmatrix} -1 & -1 \\ 1 & 1 \end{bmatrix}, \quad b(t) = \begin{bmatrix} 0 \\ -\cos(t) \end{bmatrix}$$

a) $v(t) = \begin{bmatrix} \cos(t) - \sin(t) \\ -\cos(t) \end{bmatrix}$

b) $v(t) = \begin{bmatrix} -\cos(t) + \sin(t) \\ -\cos(t) \end{bmatrix}$

c) $v(t) = \begin{bmatrix} -\cos(t) + \sin(t) \\ -2\cos(t) \end{bmatrix}$

d) $v(t) = \begin{bmatrix} \sin(t) \\ -\sin(t) - \cos(t) \end{bmatrix}$

e) $v(t) = \begin{bmatrix} -\cos(t) \\ \cos(t) - \sin(t) \end{bmatrix}$

f) None of the above.

Question 9

Your answer is INCORRECT.

Given the linear differential system **x** ' = *A***x** with

$$A = \begin{bmatrix} -5 & 2 \\ 18 & 0 \end{bmatrix}$$

Determine if **u**, **v** form a fundamental solution set. If so, give the general solution to the system.

$$u = \begin{bmatrix} -2e^{-9t} \\ 4e^{-9t} \end{bmatrix}, \quad v = \begin{bmatrix} 4e^{-9t} \\ -8e^{-9t} \end{bmatrix}$$

a) *Not a fundamental solution set.*

b) $\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = C_1 \begin{bmatrix} e^{-9t} \\ -2e^{-9t} \end{bmatrix} + C_2 \begin{bmatrix} -2e^{-9t} \\ 4e^{-9t} \end{bmatrix}$

c) $\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = C \begin{bmatrix} e^{t} \\ e^{t} \end{bmatrix} + C \begin{bmatrix} e^{\frac{1}{3}t} \\ -e^{\frac{1}{3}t} \end{bmatrix}$

d) ○ $$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -2e^{-9t} \\ 4e^{-9t} \end{bmatrix} + \begin{bmatrix} 4e^{-9t} \\ -8e^{-9t} \end{bmatrix}$$

e) ◉ $$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = C_1 \begin{bmatrix} -2e^{-9t} \\ 4e^{-9t} \end{bmatrix} + C_2 \begin{bmatrix} 4e^{-9t} \\ -8e^{-9t} \end{bmatrix}$$

f) ○ None of the above.

Question 10

Your answer is INCORRECT.

Let X be the matrix function

$$X(t) = \begin{bmatrix} 0 & 3te^{-t} & e^{-t} \\ 1 & e^{-t} & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

Determine if X is a fundamental matrix for system $\mathbf{x}' = A\mathbf{x}$ with

$$A = \begin{bmatrix} -1 & 3 & -3 \\ 0 & -1 & 1 \\ 0 & 0 & 0 \end{bmatrix}$$

If so, find the solution of the system that satisfies

$$x(0) = \begin{bmatrix} 5 \\ 4 \\ 2 \end{bmatrix}$$

a) ○ *Not a fundamental solution set.*

b) ○ $$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = 5\begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} + 4\begin{bmatrix} 3te^{-t} \\ e^{-t} \\ 0 \end{bmatrix} + 5\begin{bmatrix} e^{-t} \\ 0 \\ 0 \end{bmatrix}$$

c) ○ $$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = 5\begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} + 2\begin{bmatrix} 3te^{-t} \\ e^{-t} \\ 0 \end{bmatrix} + 2\begin{bmatrix} e^{-t} \\ 0 \\ 0 \end{bmatrix}$$

d) ○ $$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = 2\begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} + 2\begin{bmatrix} 3te^{-t} \\ e^{-t} \\ 0 \end{bmatrix} + 5\begin{bmatrix} e^{-t} \\ 0 \\ 0 \end{bmatrix}$$

e) ○ $$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = 2\begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} + 6\begin{bmatrix} 3te^{-t} \\ e^{-t} \\ 0 \end{bmatrix} + 2\begin{bmatrix} e^{-t} \\ 0 \\ 0 \end{bmatrix}$$

f) ◉ None of the above.

Question 11

Your answer is CORRECT.

Find the general solution to the system **x** ' = A**x** where A is the given matrix.

$$A = \begin{bmatrix} -1 & 4 \\ 3 & 3 \end{bmatrix}$$

a) ○ $\mathbf{x}(t) = C_1 e^{-5t}\begin{bmatrix} 3 \\ -4 \end{bmatrix} + C_2 e^{-3t}\begin{bmatrix} -1 \\ 3 \end{bmatrix}$

b) ○ $\mathbf{x}(t) = C_1 e^{5t}\begin{bmatrix} -2 \\ 1 \end{bmatrix} + C_2 e^{3t}\begin{bmatrix} -1 \\ -3 \end{bmatrix}$

c) ○ $\mathbf{x}(t) = C_1 e^{5t}\begin{bmatrix} -2 \\ 1 \end{bmatrix} + C_2 e^{-3t}\begin{bmatrix} 2 \\ 3 \end{bmatrix}$

d) ◉ $\mathbf{x}(t) = C_1 e^{5t}\begin{bmatrix} 2 \\ 3 \end{bmatrix} + C_2 e^{-3t}\begin{bmatrix} -2 \\ 1 \end{bmatrix}$

e) ○ $\mathbf{x}(t) = C_1 e^{-5t}\begin{bmatrix} -1 \\ -4 \end{bmatrix} + C_2 e^{3t}\begin{bmatrix} -2 \\ 1 \end{bmatrix}$

f) ○ None of the above.

Question 12

Your answer is CORRECT.

Find the general solution to the system **x** ' = A**x** where A is the given matrix.

$$A=\begin{bmatrix} 1 & 6 \\ 4 & 3 \end{bmatrix}$$

a) ◉ $\mathbf{x}(t)= C_1 e^{7t}\begin{bmatrix} 1 \\ 1 \end{bmatrix} + C_2 e^{-3t}\begin{bmatrix} -3 \\ 2 \end{bmatrix}$

b) ○ $\mathbf{x}(t)= C_1 e^{-7t}\begin{bmatrix} 1 \\ -6 \end{bmatrix} + C_2 e^{3t}\begin{bmatrix} -3 \\ 2 \end{bmatrix}$

c) ○ $\mathbf{x}(t)= C_1 e^{7t}\begin{bmatrix} -3 \\ 2 \end{bmatrix} + C_2 e^{-3t}\begin{bmatrix} 1 \\ 1 \end{bmatrix}$

d) ○ $\mathbf{x}(t)= C_1 e^{7t}\begin{bmatrix} -3 \\ 2 \end{bmatrix} + C_2 e^{3t}\begin{bmatrix} 1 \\ -4 \end{bmatrix}$

e) ○ $\mathbf{x}(t)= C_1 e^{-7t}\begin{bmatrix} 4 \\ -6 \end{bmatrix} + C_2 e^{-3t}\begin{bmatrix} 1 \\ 3 \end{bmatrix}$

f) ○ None of the above.

Question 13

Your answer is CORRECT.

Find a fundemental set of solution vectors of the system **x** ' = *A***x** where *A* is the given matrix:

$$A=\begin{bmatrix} 1 & 5 \\ 0 & 2 \end{bmatrix}$$

and find the solution that satisfies the initial condition:

$$x(0)=\begin{bmatrix} -3 \\ 3 \end{bmatrix}$$

a) ○ $\mathbf{x}(t)= -36\,e^{-t}\begin{bmatrix} 0 \\ -5 \end{bmatrix} - 3\,e^{2t}\begin{bmatrix} 1 \\ 2 \end{bmatrix}$

b) ◉ $\mathbf{x}(t)= -18\,e^{t}\begin{bmatrix} 1 \\ 0 \end{bmatrix} + 3\,e^{2t}\begin{bmatrix} 5 \\ 1 \end{bmatrix}$

c) ○ $\mathbf{x}(t)= -18\,e^{-t}\begin{bmatrix} 1 \\ -5 \end{bmatrix} + 18\,e^{-2t}\begin{bmatrix} 5 \\ 1 \end{bmatrix}$

d) ○ **x**(t)= $36\,e^{t}\begin{bmatrix}5\\1\end{bmatrix}-3\,e^{-2t}\begin{bmatrix}1\\0\end{bmatrix}$

e) ○ **x**(t)= $3\,e^{t}\begin{bmatrix}5\\1\end{bmatrix}-18\,e^{2t}\begin{bmatrix}1\\0\end{bmatrix}$

f) ○ None of the above.

Question 14

Your answer is INCORRECT.

Find the eigenvalues and number of independent eigenvectors. (Hint: 3 is an eigenvalue.)

$$\begin{bmatrix}-7 & 4 & 1\\-10 & 6 & 2\\-10 & 3 & 5\end{bmatrix}$$

a) ○ Eigenvalues: 3, -3, -2; Number of independent eigenvectors: 3

b) ◉ Eigenvalues: -3, -3, -2; Number of independent eigenvectors: 2

c) ○ Eigenvalues: 3, -2, 2; Number of independent eigenvectors: 3

d) ○ Eigenvalues: 3, 3, -2; Number of independent eigenvectors: 2

e) ○ Eigenvalues: 3, -2, -2; Number of independent eigenvectors: 3

f) ○ None of the above.

Question 15

Your answer is CORRECT.

Find the eigenvalues and number of independent eigenvectors. (Hint: -1 is an eigenvalue.)

$$\begin{bmatrix}-5 & 2 & 0\\-4 & 1 & 0\\-4 & 4 & -3\end{bmatrix}$$

a) ○ Eigenvalues: -1, 3, 3; Number of independent eigenvectors: 2

b) ○ Eigenvalues: -1, 1, -3; Number of independent eigenvectors: 2

c) ○ Eigenvalues: -1, -3, -3; Number of independent eigenvectors: 2

d) ○ Eigenvalues: -1, 3, -3; Number of independent eigenvectors: 3

e) ◉ Eigenvalues: -1, -3, -3; Number of independent eigenvectors: 3

f) ○ None of the above.

Question 16

Your answer is INCORRECT.

Find the general solution to the system $\mathbf{x}' = A\mathbf{x}$ where A is the given matrix.

$$A=\begin{bmatrix} 1 & -4 & 0 \\ -4 & 2 & 4 \\ 1 & -2 & 0 \end{bmatrix}$$

Hint: -2 is an eigenvalue.

a) ○ $\mathbf{x}(t)= C_1 e^{-t}\begin{bmatrix} 1 \\ 4 \\ 0 \end{bmatrix} + C_2 e^{-4t}\begin{bmatrix} 8 \\ -6 \\ 5 \end{bmatrix} + C_3 e^{-2t}\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$

b) ○ $\mathbf{x}(t)= C_1 e^{-t}\begin{bmatrix} 0 \\ 4 \\ -4 \end{bmatrix} + C_2 e^{4t}\begin{bmatrix} 1 \\ -4 \\ 1 \end{bmatrix} + C_3 e^{-2t}\begin{bmatrix} 1 \\ 0 \\ -4 \end{bmatrix}$

c) ○ $\mathbf{x}(t)= C_1 e^{t}\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} + C_2 e^{4t}\begin{bmatrix} 8 \\ -6 \\ 5 \end{bmatrix} + C_3 e^{-2t}\begin{bmatrix} 4 \\ 3 \\ 1 \end{bmatrix}$

d) ○ $\mathbf{x}(t)= C_1 e^{t}\begin{bmatrix} 8 \\ -6 \\ 5 \end{bmatrix} + C_2 e^{5t}\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} + C_3 e^{-2t}\begin{bmatrix} 4 \\ 3 \\ 1 \end{bmatrix}$

e) ◉ $\mathbf{x}(t)= C_1 e^{t}\begin{bmatrix} 8 \\ -6 \\ 5 \end{bmatrix} + C_2 e^{-5t}\begin{bmatrix} 1 \\ 0 \\ -4 \end{bmatrix} + C_3 e^{-2t}\begin{bmatrix} 1 \\ 0 \\ -4 \end{bmatrix}$

f) ○ None of the above.

Question 17

Your answer is INCORRECT.

Find a fundemental set of solution vectors of the system $\mathbf{x}' = A\mathbf{x}$ where A is the given matrix:

$$A=\begin{bmatrix} 2 & -3 & 4 \\ -2 & 5 & -4 \\ 0 & 3 & -2 \end{bmatrix}$$

and find the solution that satisfies the initial condition:

$$x(0)=\begin{bmatrix}-2\\1\\0\end{bmatrix}$$

Hint: 4 is an eigenvalue.

a) ○ **x**(t)= $\frac{2}{15}e^{-t}\begin{bmatrix}0\\4\\3\end{bmatrix}-\frac{4}{3}e^{3t}\begin{bmatrix}-3\\1\\3\end{bmatrix}+\frac{9}{5}e^{4t}\begin{bmatrix}-1\\2\\1\end{bmatrix}$

b) ○ **x**(t)= $\frac{2}{15}e^{t}\begin{bmatrix}2\\3\\4\end{bmatrix}+\frac{2}{15}e^{-2t}\begin{bmatrix}0\\4\\3\end{bmatrix}+\frac{9}{5}e^{4t}\begin{bmatrix}1\\1\\1\end{bmatrix}$

c) ○ **x**(t)= $-\frac{1}{15}e^{-t}\begin{bmatrix}0\\4\\3\end{bmatrix}-\frac{2}{3}e^{-3t}\begin{bmatrix}2\\-4\\-3\end{bmatrix}+\frac{1}{15}e^{4t}\begin{bmatrix}2\\-4\\-3\end{bmatrix}$

d) ○ **x**(t)= $\frac{1}{15}e^{-t}\begin{bmatrix}-3\\1\\3\end{bmatrix}-\frac{2}{3}e^{2t}\begin{bmatrix}0\\4\\3\end{bmatrix}+\frac{9}{5}e^{4t}\begin{bmatrix}-1\\2\\1\end{bmatrix}$

e) ◉ **x**(t)= $-\frac{2}{3}e^{t}\begin{bmatrix}4\\3\\-2\end{bmatrix}-\frac{2}{3}e^{2t}\begin{bmatrix}2\\-2\\0\end{bmatrix}+\frac{9}{5}e^{4t}\begin{bmatrix}2\\-4\\-3\end{bmatrix}$

f) ○ None of the above.

Question 18

Your answer is CORRECT.

Find the general solution to the system **x** ' = A**x** where A is the given matrix.

$$A=\begin{bmatrix}-2&4\\-1&-2\end{bmatrix}$$

a) ○ **x**(t)= $C_1e^{-2t}\left(\cos(2t)\begin{bmatrix}1\\0\end{bmatrix}-\sin(2t)\begin{bmatrix}-2\\0\end{bmatrix}\right)+C_2e^{-2t}\left(\cos(2t)\begin{bmatrix}0\\1\end{bmatrix}+\sin(2t)\begin{bmatrix}0\\-2\end{bmatrix}\right)$

b) ○ **x**(t)= $C_1e^{-2t}\left(\cos(2t)\begin{bmatrix}1\\2\end{bmatrix}+\sin(2t)\begin{bmatrix}0\\-2\end{bmatrix}\right)+C_2e^{-2t}\left(\cos(2t)\begin{bmatrix}-2\\0\end{bmatrix}-\sin(2t)\begin{bmatrix}1\\2\end{bmatrix}\right)$

c) ○ $\mathbf{x}(t)= C_1 e^{-2t}\left(\cos(2t)\begin{bmatrix}0\\1\end{bmatrix} - \sin(2t)\begin{bmatrix}1\\2\end{bmatrix}\right) + C_2 e^{-2t}\left(\cos(2t)\begin{bmatrix}1\\2\end{bmatrix} + \sin(2t)\begin{bmatrix}0\\1\end{bmatrix}\right)$

d) ◉ $\mathbf{x}(t)= C_1 e^{-2t}\left(\cos(2t)\begin{bmatrix}0\\1\end{bmatrix} - \sin(2t)\begin{bmatrix}-2\\0\end{bmatrix}\right) + C_2 e^{-2t}\left(\cos(2t)\begin{bmatrix}-2\\0\end{bmatrix} + \sin(2t)\begin{bmatrix}0\\1\end{bmatrix}\right)$

e) ○ $\mathbf{x}(t)= C_1 e^{2t}\left(\cos(2t)\begin{bmatrix}1\\0\end{bmatrix} + \sin(2t)\begin{bmatrix}-2\\0\end{bmatrix}\right) + C_2 e^{-2t}\left(\cos(2t)\begin{bmatrix}-2\\0\end{bmatrix} - \sin(2t)\begin{bmatrix}0\\1\end{bmatrix}\right)$

f) ○ None of the above.

Question 19

Your answer is CORRECT.

Find the general solution to the system $\mathbf{x}' = A\mathbf{x}$ where A is the given matrix.

$$A=\begin{bmatrix}-2 & 3\\-3 & 4\end{bmatrix}$$

a) ◉ $\mathbf{x}(t)= C_1 e^{t}\begin{bmatrix}1\\1\end{bmatrix} + C_2\left(e^{t}\begin{bmatrix}-1\\0\end{bmatrix} + t e^{t}\begin{bmatrix}1\\1\end{bmatrix}\right)$

b) ○ $\mathbf{x}(t)= C_1 e^{-t}\begin{bmatrix}1\\-1\end{bmatrix} + C_2 t e^{t}\begin{bmatrix}-1\\0\end{bmatrix}$

c) ○ $\mathbf{x}(t)= C_1 e^{-t}\begin{bmatrix}-1\\0\end{bmatrix} + C_2\left(e^{-t}\begin{bmatrix}-1\\0\end{bmatrix} + t e^{-t}\begin{bmatrix}1\\1\end{bmatrix}\right)$

d) ○ $\mathbf{x}(t)= C_1 e^{t}\begin{bmatrix}1\\-1\end{bmatrix} + C_2 t e^{t}\begin{bmatrix}-1\\0\end{bmatrix}$

e) ○ $\mathbf{x}(t)= C_1 e^{t}\begin{bmatrix}1\\1\end{bmatrix} + C_2\left(e^{t}\begin{bmatrix}1\\1\end{bmatrix} + t e^{t}\begin{bmatrix}-1\\0\end{bmatrix}\right)$

f) ○ None of the above.

Question 20

Your answer is CORRECT.

Find the eigenvalues and number of independent eigenvectors.

$$\begin{bmatrix} 0 & 2 & -3 \\ 2 & 0 & -3 \\ 8 & -2 & -4 \end{bmatrix}$$

a) Eigenvalues: 2, -1 + 3*i*, -1 - 3*i*; Number of independent eigenvectors: 3

b) Eigenvalues: -1, 3 + *i*, 3 - *i*; Number of independent eigenvectors: 3

c) Eigenvalues: -2, -1 + 3*i*, -1 - 3*i*; Number of independent Eigenvectors: 3

d) Eigenvalues: 1, -1 + 3*i*, -1 - 3*i*; Number of independent eigenvectors: 3

e) Eigenvalues: -2, 3 + *i*, 3 - *i*; Number of independent eigenvectors: 3

f) None of the above.