3×3 Exercise Set M (recurrence relations)

Linear Algebra, Dave Bayer, November 27, 2016

[1] Find A^n where A is the matrix

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

[2] Find A^n where A is the matrix

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

[3] Find A^n where A is the matrix

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

[4] Find A^n where A is the matrix

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

[5] Find A^n where A is the matrix

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

[6] Find A^n where A is the matrix

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

[7] Find A^n where A is the matrix

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

[8] Find A^n where A is the matrix

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

3×3 Exercise Set N (recurrence relations, repeated roots)

Linear Algebra, Dave Bayer, November 27, 2016

[1] Find A^n where A is the matrix

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

[2] Find A^n where A is the matrix

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

[3] Find A^n where A is the matrix

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

[4] Find A^n where A is the matrix

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

[5] Find A^n where A is the matrix

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

[6] Find A^n where A is the matrix

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

[7] Find A^n where A is the matrix

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

[8] Find A^n where A is the matrix

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

3×3 Exercise Set O (recurrence relations, identical roots)

Linear Algebra, Dave Bayer, November 27, 2016

[1] Find A^n where A is the matrix

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

[2] Find A^n where A is the matrix

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

[3] Find A^n where A is the matrix

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

[4] Find A^n where A is the matrix

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

[5] Find A^n where A is the matrix

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

[6] Find A^n where A is the matrix

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

[7] Find A^n where A is the matrix

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

[8] Find A^n where A is the matrix

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

3×3 Exercise Set P (differential equations)

Linear Algebra, Dave Bayer, November 27, 2016

[1] Find e^{At} where A is the matrix

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

[2] Find e^{At} where A is the matrix

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

[3] Find e^{At} where A is the matrix

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

[4] Find e^{At} where A is the matrix

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

[5] Find e^{At} where A is the matrix

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

[6] Find e^{At} where A is the matrix

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

[7] Find e^{At} where A is the matrix

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

[8] Find e^{At} where A is the matrix

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

3×3 Exercise Set Q (differential equations, repeated roots)

Linear Algebra, Dave Bayer, November 27, 2016

[1] Find e^{At} where A is the matrix

$$A = \begin{bmatrix} 0 & 1 & 0 \\ -1 & -4 & -3 \\ -1 & 1 & 1 \end{bmatrix}$$

[2] Find e^{At} where A is the matrix

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

[3] Find e^{At} where A is the matrix

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

[4] Find e^{At} where A is the matrix

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

[5] Find e^{At} where A is the matrix

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

[6] Find e^{At} where A is the matrix

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

[7] Find e^{At} where A is the matrix

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

[8] Find e^{At} where A is the matrix

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

3×3 Exercise Set R (differential equations, identical roots)

Linear Algebra, Dave Bayer, November 27, 2016

[1] Find e^{At} where A is the matrix

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

[2] Find e^{At} where A is the matrix

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

[3] Find e^{At} where A is the matrix

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

[4] Find e^{At} where A is the matrix

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

[5] Find e^{At} where A is the matrix

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

[6] Find e^{At} where A is the matrix

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

[7] Find e^{At} where A is the matrix

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

[8] Find e^{At} where A is the matrix

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

3×3 Exercise Set S (Markov chains)

Linear Algebra, Dave Bayer, November 27, 2016

[1] Find A^n where A is the matrix

$$A = \begin{bmatrix} 4 & 1 & 1 \\ 1 & 3 & 1 \\ 0 & 1 & 3 \end{bmatrix}$$

[2] Find A^n where A is the matrix

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

[3] Find A^n where A is the matrix

$$A = \begin{bmatrix} 4 & 1 & 1 \\ 0 & 3 & 2 \\ 1 & 1 & 2 \end{bmatrix}$$

[4] Find A^n where A is the matrix

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 3 & 3 & 0 \\ 0 & 1 & 4 \end{bmatrix}$$

[5] Find A^n where A is the matrix

$$A = \begin{bmatrix} 2 & 1 & 0 \\ 2 & 3 & 1 \\ 1 & 1 & 4 \end{bmatrix}$$

[6] Find A^n where A is the matrix

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

[7] Find A^n where A is the matrix

$$A = \begin{bmatrix} 4 & 0 & 1 \\ 1 & 2 & 1 \\ 0 & 3 & 3 \end{bmatrix}$$

[8] Find A^n where A is the matrix

$$A = \begin{bmatrix} 3 & 2 & 1 \\ 1 & 2 & 0 \\ 1 & 1 & 4 \end{bmatrix}$$