Mathematics Review Course
Summer 2023
Problem Set 07
Solutions

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Row Echelon Form

1. [Uni. Manitoba] Reduced REF for $\begin{pmatrix} 2 & -3 & -2 & 3 \\ -2 & 2 & -2 & 0 \\ -1 & 3 & 3 & 2 \\ -3 & -2 & -2 & 2 \end{pmatrix}$.

Solution:

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

2. [Uni. Manitoba] Reduced REF for $\begin{pmatrix} -1 & 1 & -1 & -2 \\ 2 & 0 & 0 & 3 \\ -1 & 0 & -1 & -2 \\ -3 & 0 & 2 & -1 \end{pmatrix}$.

Solution:

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

Cramer's Rule

3. Solve for x, y, z given $\begin{pmatrix} -2 & 4 & 1 & | & 4 \\ -2 & 2 & 1 & | & -4 \\ -6 & 1 & 6 & | & -26 \end{pmatrix}$.

Solution:

$$x = 7$$
$$y = 4$$
$$z = 2$$

4. Solve for x, y, z given $\begin{pmatrix} -5 & -2 & 4 & | & -28 \\ -5 & -3 & 6 & | & -27 \\ -3 & 5 & -5 & | & -18 \end{pmatrix}$.

Solution:

$$x = 6$$
$$y = 1$$
$$z = 1$$

Eigenvalues

5. Find the Eigenvalues for $\begin{bmatrix} 2 & 2 & -2 \\ 1 & 3 & -1 \\ -1 & 1 & 1 \end{bmatrix}$.

Solution:
$$\lambda = \{0, 2, 4\}$$

6. Find the Eigenvalues for $\begin{bmatrix} 33 & 105 & 105 \\ 10 & 28 & 30 \\ -20 & -60 & -62 \end{bmatrix}$.

Solution:
$$\lambda = \{-2, 3\}$$