**Section 2**

1. Solve $\left\{\begin{array}{c}x+y+z=2\\2x-y-2z=0 \\3x+2y-4z= -1\end{array}\right. using Gauaaisan elimination, show step please$

$2. \left(\begin{array}{c}2 1 1\\-1 1 2\\3 1 1\end{array}\right)$Find the determinant of the matrix 3.$\left(\begin{array}{c}-7 12\\-4 7\end{array}\right) Find the eigenvalues and corresponding eogenvectors$

$4.\left(\begin{array}{c}2 4\\1 2\end{array}\right)\left(\begin{array}{c}x\\y\end{array}\right)=\left(\begin{array}{c}0\\0\end{array}\right)$ Determine the solutions of the system, write the answers in parametric form.

5. Given that the $\left(\begin{array}{c}2 1 \\ 1 2 \\3 3\end{array}\right)$is a symmetric matrix, fill in the 3missing entries?

6. If the eigenvalues of 4 x 4 matrix are 2, 3, 5 ± 2i, is it possible that the matrix is a symmetric matrix? Explain.

1. If $→$and $→$ are eigenvectors for the two different eigenvalues of a symmetric matrix, how are $→ and → related geometrically?$
2. What is the inverse of an orthogonal matrix Q?
3. On the same set of axes, sketch the solutions to the system

$\left(\begin{matrix}1&2\\-1&-2\end{matrix}\right)\left(\begin{array}{c}x\\y\end{array}\right)= \left(\begin{array}{c}3\\-3\end{array}\right)$along with the solutions to the corresponding homogeneous system. How are the sets of solutions related?

10. $\left(\begin{array}{c}1 2 -1\\2 1 1\\3 1 2\end{array}\right)\left(\begin{array}{c}x\\y\\z\end{array}\right)= \left(\begin{array}{c}-2\\2\\4\end{array}\right)$determine all solutions of the system and write your answer in parametric form.

11. Determine the parabola y = a + bx+ cx2which best fits the 6 data points

(-2,3.5),(-1,0.5),(0,-1),(1, 1),(2,1.5),and (3,4).Be sure to write out the originalsystem of equations (should be 6 equations and 3 unknowns), write the normal equations(should be 3 equations and 3 unknowns), and then solve to find a, b,and c (you can solveusing any tool you wish).

12. Rewrite the equation of the ellipse x2+4xy+9y2= 1 as A$\left(\begin{array}{c}x\\y\end{array}\right).\left(\begin{array}{c}x\\y\end{array}\right)= $ 1 with

A being a symmetric matrix. Use the eigenvalues and eigenvectors of A to determine thedirections and lengths of the major and minor axes (give numbers in decimal form roundedto 2 decimal places). Also based on the information you have, give a rough sketch of theellipse