Engineering Math 2   Quiz 1

1. Find the inverse by Gauss-Jordan or state that it does not exist.
   Check by using $AA^{-1}=A^{-1}A=I$

$$\begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 5 & 4 & 1 \end{pmatrix}$$

2. Find all solutions or indicate that no solution exists.

$$\begin{aligned} -2x - 4y + 7z &= -6 \\ x + 2y + 16z &= 3 \end{aligned}$$

3. Quadratic form is given.

$$3x_1^2 - 8x_1x_2 - 3x_2^2 = 0$$

     i.   Express the quadratic form as $q = x^T A x$

     ii.   Find eigenvalues and eigenvectors of A

     iii.   Transform it to principal axes $\left(q = y^T \Lambda y \right)$

4. Find a general solution of the ODE $y'' + w^2 y = r(t)$ with $r(t)$ as given.

$$r(t) = \sin t + \frac{1}{3}\sin 3t + \frac{1}{5}\sin 5t + \frac{1}{7}\sin 7t$$