1. Carefully state the definition of the “polynomial space” $P(t)$. Give two example vectors from $P_1(t)$.

2. List, in any order, the three elementary operations that leave unchanged the solution set to a system of linear equations.
3. Solve the following system of equations using Gaussian elimination and back-substitution.

\begin{align*}
2y - z &= 1 \\
x - y + z &= 1 \\
2x + y + 2z &= 2
\end{align*}

4. Consider the system of equations \( \{2x - 2y = 4, 4x + ay = b\} \). For which values of \( a, b \) does this have exactly one solution (and what is it)? For which values of \( a, b \) does this have no solution? For which values of \( a, b \) does this have infinitely many solutions?

5. Find a set of points in the plane that have infinitely many lines of best fit. Be sure to justify your answer.