1. Carefully define the term “basis”. Give two examples in $\mathbb{R}^2$.

2. Consider the linear mapping $f : \mathbb{R}^3 \rightarrow \mathbb{R}^4$ given by $f(x, y, z) = (x - y, y - z, z - x, x + z - 2y)$. Represent $f$ as a matrix multiplication.

3. Use Gaussian elimination to put \[
\begin{bmatrix}
2 & 4 & 5 & 6 \\
0 & 0 & 1 & 2 \\
1 & 2 & 3 & 4 \\
\end{bmatrix}
\] into echelon form.

4. Find all solutions to the following system of linear equations.

\[
\begin{align*}
4u - 3w &= 0 \\
-2u + 3v + 2w &= -1 \\
6u - 6v - 6w &= 1
\end{align*}
\]

\[\text{Student Performance on Embedded Questions}\]

<table>
<thead>
<tr>
<th>Question</th>
<th>Right</th>
<th>Partially Right</th>
<th>Wrong</th>
</tr>
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<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
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<tr>
<td>4</td>
<td>77%</td>
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Note: $n = 13$; Percentages may not add to 100\% due to rounding.