1. Express \( w = [9, 17, -6] \) as a linear combination of \( u = [3, 1, 0] \) and \( v = [2, -4, 2] \).

2. Find the angle between the vectors \( u = [3, 1, 0] \) and \( v = [2, -4, 2] \).

3. Let \( u, v \) and \( w \) be vectors in \( \mathbb{R}^n \). If \( u \) is perpendicular to both \( v \) and \( w \), show that \( u \) is also perpendicular to \( 5v + w \).

4. Let \( S \) be a set of vectors. What is the definition of the span of \( S \)?

For #5 and #6, Let \( A = \begin{bmatrix} 2 & 1 \\ 0 & -1 \\ 3 & 2 \end{bmatrix} \) and \( B = \begin{bmatrix} 3 & 0 \\ 1 & -2 \\ -1 & 4 \end{bmatrix} \)

5. Find \( 2A + B \)

6. Compute \( A^T A \)

7. Use the Gauss-Jordan method (row operations) to solve the system of equations:
   \[
   \begin{align*}
   x_1 - 3x_2 + x_3 &= 2 \\
   3x_1 - 8x_2 + 2x_3 &= 5
   \end{align*}
   \]

8. Find the inverse of the matrix \( \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & 5 \\ 3 & 2 & 1 \end{bmatrix} \) (by hand)

9. Solve the system of equations:
   \[
   \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & 5 \\ 3 & 2 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ 12 \\ 10 \end{bmatrix}
   \]
   (Hint: compare with #8)

10. As part of a board game, a player spins the spinner drawn below and moves his/her marker the appropriate number of places around the board. Construct the transition matrix for this game. (Hint: it is an 8X8 matrix, with 5 zeros in nearly every column).

<table>
<thead>
<tr>
<th>Space A</th>
<th>Space B</th>
<th>Space C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space H</td>
<td></td>
<td>Space D</td>
</tr>
<tr>
<td>Space G</td>
<td>Space F</td>
<td>Space E – If you land here, subtract 1 from your next spin</td>
</tr>
</tbody>
</table>