Problem 1: Ans: \( \vec{x} = t \begin{pmatrix} -3 \\ -2 \\ 1 \\ 0 \end{pmatrix} + \begin{pmatrix} 1 \\ -1 \\ 0 \\ 3 \end{pmatrix} \)

Problem 2 a) The matrix is \( \begin{pmatrix} 1 & 2 & -1 \\ -5 & 0 & 1 \end{pmatrix} \)

b) \( B \) is never 1-1, since it has more columns than rows.

c) When \( h \neq 2 \), the two rows are not multiples of each other, there are 2 pivots, and \( B \) is onto.

Problem 3. a) Write down the matrix whose columns are \( u, v, w \) and \( \alpha \). This matrix, put in REF, becomes \( \begin{pmatrix} 1 & 3 & 3 & 1 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \). Since there is a pivot in the last column, the system is inconsistent, so \( \alpha \) is NOT in the span of \( u, v, w \).

b) NOT independent. \( w = 2v - 3u \).

Problem 4. \( A \) is invertible. By row reducing \([A \ I]\) you get \([I \ A^{-1}]\). The answer is

\[
A^{-1} = \begin{pmatrix} -1 & 12 & -5 \\ 1 & -9 & 4 \\ 0 & 2 & -1 \end{pmatrix}.
\]

Problem 5. True of False The true statements are a, c, d, f, and g. About the false statements...

b) \( A \) is 1-1 but not onto.

e) If the columns are linearly independent, then \( A \) is 1-1, not onto.