Math 251 Test 2

Place your name in the upper right hand corner. Show your work on a separate sheet. Staple the work sheet to your test when you hand it in. You may use your book, calculator, and the handouts I have given you. Don’t forget, Mathematics is Latin for having a really good time. 😊

1) Find the parametric equation for the line that passes through, $(1,0,1,0)$ and $(1,0,1)$

2) Find the parametric equation for the plane that contains $(1,0,1,0)$, $(1,0,1)$, and $(0,1,1)$.

3) Find two vectors that span the plane $x - 2y - 3z = 0$.

4) Verify the Jacobi identity for the following three vectors: $(1,0,0)$, $(0,1,0)$, and $(0,0,1)$.

5) Consider the following polynomials: $p_1 = t^2 - 1$, $p_2 = t^2 - t$, and $p_3 = t + 1$. Show that any quadratic polynomial can be written in terms of these.

\[ at^2 + bt + c = \]

6) Find the null, row, and column space of

$\begin{bmatrix}
1 & 1 \\
0 & 1 \\
0 & 1
\end{bmatrix}$
7) Find the matrices to transform between the following bases,

\[ S = \{ v_1, v_2, v_3 \} \quad \square \quad T = \{ w_1, w_2, w_3 \} \]

\[ v_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, \quad v_2 = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}, \quad v_3 = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \quad w_1 = \begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix}, \quad w_2 = \begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix}, \quad w_3 = \begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix}. \]

10) Use the Gram-Schmidt process to construct an orthonormal basis from;

\[ \{(1, 0, 1), (1, 1, 0), (1, 1, 1)\} \]