Peter Cholak Math 221 Wednesday, October 16 Quiz 2
Be sure to justify your answers!

(7 points) Find a vector $\vec{u}$ in $\mathbb{R}^2$ so that $\vec{u}$ is orthogonal to $\vec{v} = (1, 1)$, and so that $\|\vec{u}\| = 2$.

(6 points) Which of the followings are subspaces of the vector space of 2×2 matrices?

Matrices of the form $\begin{bmatrix} a & 2a \\ b & 0 \end{bmatrix}$, for any real numbers a and b. Matrices of the form $\begin{bmatrix} a+1 & 2a \\ b & 0 \end{bmatrix}$, for any real numbers a and b.

Turn over; more problems on the back!

(6 points) T is the function from $\mathbb{R}^2$ to $\mathbb{R}^2$ such that $T(x, y) = (2x - y, y)$. Is T linear? Is T one-to-one? What is the range of T?

(6 points) Consider the vector space P of polynomial functions. Is $2x - x^2$ in span of $1 - x, 3x - x^2$? Is 3 in the span of $1 - x, 3x - x^2$?