Name: _____

206 Quiz 3

1. Consider the line L given by $y = 3x$.
   (a) Find a vector $\mathbf{w}$ that is parallel to L.

   (b) Find $\mathbf{u}^{\parallel}$ and $\mathbf{u}^{\perp}$ for $\mathbf{u} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$. Draw a picture illustrating this.

   (c) Let $T(\mathbf{x}) = \text{proj}_L \mathbf{x}$. What is $T(T(\mathbf{x}))$? Why?

(d) Find the matrix A so that $T(\mathbf{x}) = A\mathbf{x}$. Compute A^2 using matrix multiplication. Explain how this is connected to the answer to part c.

(e) Find the set of vectors $\mathbf{x}$ so that $T(\mathbf{x}) = \begin{bmatrix} 2 \\ 6 \end{bmatrix}$. Draw a picture illustrating your result.