MA322-001 Feb 28 Quiz Name:________________________

#1 From class: Our "universe" of vectors will be real valued functions, $f : \mathbb{R} \to \mathbb{R}$, like $\cos(x)$ and e^x and x, and as described in example 5 of section 4.1. Our subspace is $W = \{f \mid f(\pi) = 0\}$, those functions that evaluate to 0 at $x = \pi$.

We claimed that $W = (T)$ where $T : V \to U : f(x) \mapsto f(\pi)$, that is, that W is the null space of a linear transformation T that takes a function and evaluates it at $x = \pi$.

(a) What should the vector space V be? It should be large (larger than W), but not so large that the definition of T as "evaluate at $x = \pi$" needs to change. V should be a vector space.

(b) What should the vector space U be? It is better to make U small, but not so small that $T(f)$ no longer is in the range. U should be a vector space.

(c) Is T a linear transformation? Show the check as in the definition on page 204, or example 8 on the next page in chapter 4.2.

See also exercises 31, 32, 34 in section 4.2.