# Matrix Theory (EE5609) Assignment 9

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***Abstract*—This document uses properties of vector spaces and subspaces.**

Download all python codes from

https://github.com/utkarshsurwade/Matrix_Theory_EE5609/tree/master/codes

and latex-tikz codes from

https://github.com/utkarshsurwade/Matrix_Theory_EE5609/tree/master/Assignment9

## 1 Problem

Let $\mathbf{V}$ be the (real) vector space of all functions $f$ from $\mathbf{R}$ into $\mathbf{R}$. Is $f(3) = 1 + f(-5)$ a subspace of $\mathbf{V}$

## 2 Solution

For each of the function to be a subspace, it must be closed with respect to addition and scalar multiplication in $\mathbf{V}$ defined as, for $f\ g\ \epsilon\ \mathbf{W}$
Then,

$$\begin{aligned}(f+g)(3) &= f(3) + g(3) && (2.0.1)\\ &= 1 + f(-5) + 1 + g(-5) && (2.0.2)\\ &= 2 + f(-5) + g(-5) && (2.0.3)\\ &= 2 + (f+g)(-5) && (2.0.4)\\ &\neq 1 + (f+g)(-5) && (2.0.5)\end{aligned}$$

Since $\mathbf{W}$ is not closed with respect to addition $\therefore$ It is not a subspace of $\mathbf{V}$.