

You have 20 minutes to complete this quiz. To receive full credit, you must justify your answers.

Name : \_\_\_\_\_

1. (5 points) Determine if the set  $D = \{f : \mathbb{R} \rightarrow \mathbb{R} \mid f \text{ is once differentiable}\}$  of once differentiable functions is a subspace of the vector space  $V = \{f : \mathbb{R} \rightarrow \mathbb{R}\}$  of all functions on  $\mathbb{R}$ .

2. (5 points) Let  $T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$  be defined by  $\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} \mapsto \begin{bmatrix} 1 & 3 & 5 \\ 2 & 8 & 10 \\ -3 & -3 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$ . Compute the volume of  $T(B)$ , where  $B$  is the box  $-1 \leq x_1 \leq 2$ ,  $0 \leq x_2 \leq 1$ ,  $1 \leq x_3 \leq 3$ .