1. Let $A = \begin{pmatrix} 2 & 6 \\ 0 & 2 \end{pmatrix}$, and let U be the unit square $\{(x, y) : 0 \le x \le 1 \text{ and } 0 \le y \le 1\}$ in $\mathbb{R}^2$. Let U' be the image under A of U. Find the area of U.

2. Find the distance from the line $(4 + t, -1 - 2t, 3 - 7t)$ to the plane $3x - 2y + z = 3$.

3. Let $A = \begin{pmatrix} 2 & -3 \\ 1 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & -2 \\ 5 & 0 \end{pmatrix}$. Find $AB - BA$.

4. Consider the function $f(x, y, z) = (x^2 + y^2)/\sin(z)$. Describe the level surfaces for different values. What coordinate system is best suited for this?

5. We say that a function $f : \mathbb{R}^m \to \mathbb{R}^n$ is linear if $f(\lambda x + \mu y) = \lambda f(x) + \mu f(y)$. Characterize all linear functions from $\mathbb{R}$ to $\mathbb{R}$. Is $f(x) = 7x - 4$ linear, according to this definition?