Math 206 Quiz Two

Name: ______________________

1. Prove the Cauchy-Schwarz inequality for $n = 2$.

2. Give two vectors in $\mathbb{R}^4$ that have angle $\frac{\pi}{4}$ between them.

3. Give an example of a $4 \times 4$ symmetric matrix.

4. Solve for $\vec{x}$

$$
\begin{bmatrix}
\frac{1}{2} & 1 \\
0 & \frac{1}{2}
\end{bmatrix}
\vec{x} = \begin{bmatrix} 4 \\ -7 \end{bmatrix}
$$

5. If $\vec{a} \cdot \vec{a} = 4$ what is $\|\vec{a}\|$?
6. Show that if $\vec{x}$ is non-zero and $T$ is an invertible linear transformation then $T\vec{x}$ is non-zero.

7. Show that if $A$ and $B$ are $n \times n$ matrices $\det(AB) = \det(A)\det(B)$.

8. Find a formula for the linear transformation on $\mathbb{R}^3$ that represents the geometric operation projection onto the $xy$-plane.

9. Give me the equation of the parallelogram in $\mathbb{R}^2$ spanned by $(3, 1)$ and $(1, -1)$.

10. What is the area of the parallelogram you gave in question 9?