Name ____ Fields and Rings, Quiz 4

1) Consider the function $f: \mathbb{C}^{2\times 2} \to \mathbb{R}$ defined by $f(M) = Re(|M|)$, that is, the $f(M)$ is the real component of the determinant of M. Show that f is *not* a homomorphism.

2) Using the same function as in (1), find $f^{-1}(\{0\})$

3) Let $C[0,5]$ be the ring of continuous functions with domain $[0,5]$ and codomain $\mathbb{R}$. The operations on $C[0,5]$ are pointwise addition and multiplication. One particular ideal of $C[0,5]$ is $I = \{f \in C[0,5]: f(3) = 0\}$. Let $f, g \in C[0,5]$. Show that the cosets $I + f$ and $I + g$ are equal if and only if $f(3) = g(3)$.