Math 222
Prof. Peter Cholak and Juan Migliore

Name: $\qquad$
Friday, January 26

Be sure to carefully write up your answers. It is suggested that you first write out a draft of your proposed questions and then carefully rewrite that draft to get your final version. You do not have to write the answers on this sheet of paper, but please staple all sheets together before turning your quiz in.

1. Show by induction that $n^{4}-4 n^{2}$ is divisible by 3 for all $n \geq 1$.
2. In the "real" world, we are used to the fact that a power of a non-zero number is again non-zero. We will later see that this fact is not true in all worlds. Show that the complex numbers do behave normally in this regard. Precisely, let $z$ be an arbitrary complex number and suppose that we have $z^{k}=0$ for some positive integer $k$. Show that $z$ must be zero. (You may use the fact that you know it to be true for real numbers.)
3. Find all the cube roots of $-8 i$. Write them in the the form $a+b i$. Be sure to show your work.
