Algebra, Math 250B
Homework five, Due March 3rd

1. Let I be an ideal in the polynomial ring in n variables over a field. Suppose that I is contained in $\sqrt{J}$, show that $I^m \subset J$ for some integer $m > 0$.

2. Let I, J be ideals. Show that if I is radical, then the colon ideal $I : J$ (we saw this in previous homework) is radical too.

3. Which of the following rings is Noetherian?

   a) The ring of power series in z with a positive radius of convergence.

   b) The ring of power series in z with an infinite radius of convergence.

4. Rotman 367-368: 5.55, 5.57,5.59,5.64.

5. In the polynomial ring $\mathbb{Z}[x]$, show the ideal $m = (2, x)$ is maxi mal and that the ideal $q = (4, x)$ is m-primary, but it is not a power of m. [HINT: as I said in class, the radical of a primary ideal J is a prime ideal m, then we say J is m-primary. Assume this is the case.]