Problem Set #3 for February 8, 2006

A commutative algebra problem.

1. Let A be any integral domain and let f be a nonzero element of A. We define A_f to be the set of all elements of the form a/f^n where $a \in A$ and f is a positive integer modulo the equivalence relation $a/f^n \sim b/f^m$ if $f^m a = f^n b$.

(a) Show that there is a bijection between prime ideals in A_f and prime ideals in A that do not contain f.

(b) Now suppose that A is equal to $A(Y)$ for Y an affine variety. Show that there is a bijection between points P in Y such that $f(P) \neq 0$ and maximal ideals in A_f.

Also, from Hartshorne
1.2:#2, #9, #13, #15
1.3: #1.