1. Let A be a local integral domain. Assume that the maximal ideal of A is principal and that A satisfies the ascending chain condition: every increasing sequence of ideals terminates. Show that every ideal of A is principal. Hint: Suppose that $\pi \in A$ generates its maximal ideal. Show that every element of A can be written as a unit times some power of π.

2. Let R be the ring of polynomials in a variable x with integer coefficients. Let M be the submodule (ideal) of R generated by 3 and x and let N be the submodule of $R \oplus R$ of relations between 3 and x. Show that N is generated by $(x, -3)$.