Exercise 6

$\{x_1, \cdots, x_n\}$ is the generating set of K, Assume Char$K = 0$ so K is finitely generated over Z and hence Q.
(7.9) says that K is finite algebraic over Q, (7.8) says that Q is finite Z-Algebra, which Q cannot be.
So assuming charK = 0 leads to a contradiction.
Assume charK not 0, charK = p, so a Z/pZ-Algebra, (7.9) says K is finite extension over Z/pZ
[K:Z/pZ] = n, [K(a):Z/pZ] < n and multiply to n so K is finite field.

Exercise 8

A[x] contains A. Infinite chain in A would mean an infinite chain in A[x] $\varphi : A \to A[x], a \mapsto a$ is an injection.

Exercise 9

Exercise 10

$M[x]$ becomes an $A[x]$-Module in the natural way. $M[x] \cong A[x] \bigotimes_A M$ (previous exercise).