4.1 Definitions/Things that are clear

A ***Polynomial with Coefficients*** in R (Let R be any ring)	An expression of the form: *$a0+a1x+a2x^2+...+a\_n\_x^n$* where ***n*** is a **nonnegative integer** and ***a_i*** ∈***R***
Expression: ***$a0 + a1x + a\_2 x^2 +...+ a\_n x^n$***	An expression of this form makes sense, provided that the ***a_i*** and ***x*** are all elements of some larger ring
In Thm 4.1, **the elements of the ring P** are called	*polynomials with coefficients in R*
In Thm 4.1, **the elements a_i** are called	*coefficients*
In Thm 4.1, **the special element *x*** is called an	*indeterminate*

4.1 Theorems & Corollaries

Theorem 4.1 *If R is a ring, then there exists a ring P that contains an element x that is not in R and has these properties:*	***(i)*** *R is a subring of P.* ***(ii)*** *xa = ax for every a∈R* ***(iii)*** *Every element of P can be written in the form* ***$a0+a1x+a2x^2+...+a\_n\_x^n$*** *for some* ***n≥0*** *and* ***a_i ∈R*** ***(iv)****The representation of elements in P in* ***(iii)*** *is unique in this sense: if n≤m and* ***$a0+a1x+a2x^2+...+a\_n\_x^n$ = $b0+b1x+b2x^2+...+b\_m\_x^m$****, then* ***a_i = b_i*** *for* ***i≤n*** *and* ***b_i = 0R*** *for each* ***i>n****.* ***(v)*** ***$a0+a1x+a2x^2+...+a\_n\_x^n$ = 0R*** *if and only if* ***a_i = 0R*** *for every* ***i****.*
Theorem 4.2	