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# Chapter 1

## Functions

### 1.1 prime\_decomp – prime decomposition

#### 1.1.1 prime\_decomp – prime decomposition

**prime\_decomp**(*p*: Integer, *polynomial*: list) → list

Return prime decomposition of the ideal (*p*) over the number field  $\mathbf{Q}[x]/(\text{polynomial})$ .

*p* should be a (rational) prime. *polynomial* should be a list of integers which defines a monic irreducible polynomial.

This method returns a list of  $(P_k, e_k, f_k)$ ,

where  $P_k$  is an instance of **Ideal\_with\_generator** expresses a prime ideal which divides (*p*),  $e_k$  is the ramification index of  $P_k$ ,  $f_k$  is the residue degree of  $P_k$ .

#### Examples

```
>>> for fact in prime_decomp.prime_decomp(3,[1,9,0,1]):
...     print fact
...
(Ideal_with_generator([BasicAlgNumber([[3, 0, 0], 1], [1, 9, 0, 1]), BasicAlgNum
ber([[7L, 20L, 4L], 3L], [1, 9, 0, 1]])], 1, 1)
(Ideal_with_generator([BasicAlgNumber([[3, 0, 0], 1], [1, 9, 0, 1]), BasicAlgNum
ber([[10L, 20L, 4L], 3L], [1, 9, 0, 1]])], 2, 1)
```