```
> # x^3 + epsilon ·x = 1
>
> f := x→ x^3 + epsilon·x = 1
```

$$f := x \mapsto x^3 + \mathrm{e} \cdot x = 1 \tag{1}$$

```
> # When epsilon is null, we get x = 1
> g := 1 + u·epsilon + v·epsilon^2
```

$$g := v\,\mathrm{e}^2 + u\,\mathrm{e} + 1 \tag{2}$$

```
> f_subs := subs(x = g, f(x))
```

$$f\_subs := (v\,\mathrm{e}^2 + u\,\mathrm{e} + 1)^3 + \mathrm{e}\,(v\,\mathrm{e}^2 + u\,\mathrm{e} + 1) = 1 \tag{3}$$

```
> f_expand := expand(f_subs)
```

$$f\_expand := \mathrm{e}^6 v^3 + 3\,\mathrm{e}^5 u\,v^2 + 3\,\mathrm{e}^4 u^2 v + 3\,\mathrm{e}^4 v^2 + \mathrm{e}^3 u^3 + 6\,\mathrm{e}^3 u\,v + \mathrm{e}^3 v + 3\,\mathrm{e}^2 u^2 + \mathrm{e}^2 u + 3\,v\,\mathrm{e}^2 + 3\,u\,\mathrm{e} + \mathrm{e} + 1 = 1 \tag{4}$$

```
> # First keep the left hand side
> left_hand_side := lhs(f_expand)
```

$$left\_hand\_side := \mathrm{e}^6 v^3 + 3\,\mathrm{e}^5 u\,v^2 + 3\,\mathrm{e}^4 u^2 v + 3\,\mathrm{e}^4 v^2 + \mathrm{e}^3 u^3 + 6\,\mathrm{e}^3 u\,v + \mathrm{e}^3 v + 3\,\mathrm{e}^2 u^2 + \mathrm{e}^2 u + 3\,v\,\mathrm{e}^2 + 3\,u\,\mathrm{e} + \mathrm{e} + 1 \tag{5}$$

```
> # Extract coeff 1 and 2
> coeff_1 := coeff(left_hand_side, epsilon, 1)
```

$$coeff\_1 := 3\,u + 1 \tag{6}$$

```
> coeff_2 := coeff(left_hand_side, epsilon, 2)
```

$$coeff\_2 := 3\,u^2 + u + 3\,v \tag{7}$$

```
> solve({coeff_1 = 0, coeff_2 = 0}, {u, v})
```

$$\left\{u = -\frac{1}{3},\ v = 0\right\} \tag{8}$$

```
> # Final result
> result := subs({u = -1/3, v = 0}, g)
```

$$result := -\frac{\mathrm{e}}{3} + 1 \tag{9}$$

```
>
```