

Exercise A.3.121 Factor the polynomial completely: $x^3 + 2x^2 - x - 2$.

Solution

We solve this by grouping. We have

$$x^3 + 2x^2 - x - 2 = x^2(x+2) - (x+2)$$

$$= (x^2 - 1)(x - 2)$$

$$= (x-1)(x+1)(x-2) \quad \text{by the difference of two squares formula } x^2 - a^2 = (x-a)(x+a) \text{ with } a=1.$$

$$\text{Ans } \boxed{x^3 + 2x^2 - x - 2 = (x-1)(x+1)(x-2).} \quad \square$$