$\boxed{(x + 3)(x - 6)(x + 1)^2}$

$x^4 - x^3 - 23x^2 - 39x - 18 \;\big|\; x^2 - 5x - 6$

$x + 3$

$\boxed{7(x + 1)(x - 2)(x + 4)(x^2 + 1)(x - 4)}$

$7x^6 - 7x^5 - 119x^4 + 105x^3 + 98x^2 + 112x + 224 \;\big|\; x^2 + 1$

$x = 3$