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How to factorise a cubic polynomial (Method 1)

If $f(x)$ is a polynomial and $f(p)=0$ then $x-p$ is a factor of $f(x)$
or
If $f(x)$ is a polynomial and $f(-q)=0$ then $x+q$ is a factor of $f(x)$

factorise $2x^3 - 3x^2 - 11x + 6$
let $f(x) \equiv 2x^3 - 3x^2 - 11x + 6$
 $\therefore f(1) = 2(1)^3 - 3(1)^2 - 11(1) + 6 = -6$
 $\therefore f(-1) = 12, f(2) = -12$
 $\therefore f(-2) = 2(-2)^3 - 3(-2)^2 - 11(-2) + 6 = 0$
 $\therefore x+2$ is a factor
 $f(x) \equiv (x+2)(?) \Rightarrow (?) = \frac{f(x)}{x+2}$

For the quadratic factor:
$$\begin{array}{r} 2x^2 - 7x + 3 \\ x+2 \overline{) 2x^3 - 3x^2 - 11x + 6} \\ \underline{- 2x^3 + 4x^2} \\ - 7x^2 - 11x \\ \underline{- 7x^2 - 14x} \\ 3x + 6 \\ \underline{- 3x + 6} \\ 0 \end{array}$$

 $\therefore f(x) \equiv (x+2)(2x^2 - 7x + 3)$
 $\equiv (x+2)(2x-1)(x-3)$
Note: $f(x) = 0$
 $\therefore x = -2, x = \frac{1}{2}, x = 3$ ✓

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