- Find all the zeros of $f(x) = 2x^3 + 5x^2 - 4x - 3$. Then give a complete factorization of f.

Looking at the list of possible rational zeros

from the previous example, let's test them.

Using a calculator...

$f(1) = 0 \Rightarrow$ $x = 1$ is a zero, $x - 1$ is a factor.

$f(-1) = 4$

$f(\frac{1}{2}) = -\frac{7}{2}$

$f(-\frac{1}{2}) = 0 \Rightarrow$ $x = -\frac{1}{2}$ is a zero, $x + \frac{1}{2}$ is a factor.

$f(3) = 84$

$f(-3) = 0 \Rightarrow x = -3$ is a zero, $x + 3$ is a factor

$f(\frac{3}{2}) = 9$

$f(-\frac{3}{2}) = \frac{15}{2}$

Factors of f are $(x-1), (x+\frac{1}{2}), (x+3)$.

So, $f(x) = 2(x-1)(x+\frac{1}{2})(x+3)$

↑ Need 2 in order to make leading term $2x^3$