Factor Theorem 2

Factor Theorem

$$x - p \text{ is a factor of } f(x) \text{ if and only if } f(p) = 0.$$

Factor Theorem Extended

A function,

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0$$

has a factor,

$$qx - p$$

if

$$f\left(\frac{p}{q}\right) = 0$$

where,

$$q \text{ divides } a_n \text{ and}$$
$$p \text{ divides } a_0.$$

Exercises

1. State all possible values $\frac{p}{q}$ that could make the given polynomial 0.

   a) $3x^3 - 4x^2 + 7x + 8$

   b) $2x^3 - 8x^2 + 5x - 6$

   c) $4x^3 + 3x^2 - 11x + 2$

   d) $6x^3 - 7x^2 + 4x + 3$

   e) $8x^3 - 7x^2 + 23x - 4$

2. Find the equation whose roots are each 6 more than the roots of $x^2 + 8x - 1 = 0$.