Factor Theorem

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Factor Theorem

$x - p$ is a factor of $f(x)$ 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 divides a_n and
p divides a_0.

Exercises

1. What is the sum of the roots of the following equations?
   (a) $x^2 + 5x + 11 = 0$
   (b) $2x^2 - 5x - 9 = 0$
   (c) $3x^2 - 7x - 8 = 0$
   (d) $x^2 - x - 20 = 0$
   (e) $-2x^2 - 8x + 13 = 0$
2. What is the product of the roots for each of the above equations in # 1.