Factor Theorem 4

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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

Solve for x.

a) $x^2 - x - 20 = 0$

b) $x^3 - 3x^2 - 4x + 12 = 0$

c) $x(x^2 - 4) = 0$

d) $x^3 - 9x^2 + 26x = 24$

e) $5x^3 - 8x^2 - 27x + 18 = 0$

f) $5(x + 1)^3 = -5$

g) $x^4 - 7 = 6x^2$

h) $(x + 1)(x + 5)(x + 3) = -3$

i) $x^8 - 10x^4 + 9 = 0$

j) $(3x - 5)(3x + 1)^2(3x + 7) + 68 = 0$

k) $\left(x - \frac{1}{x}\right)^2 - \frac{27}{12}\left(x - \frac{1}{x}\right) + 10 = 0$