INDIAN INSTITUTE OF TECHNOLOGY MADRAS

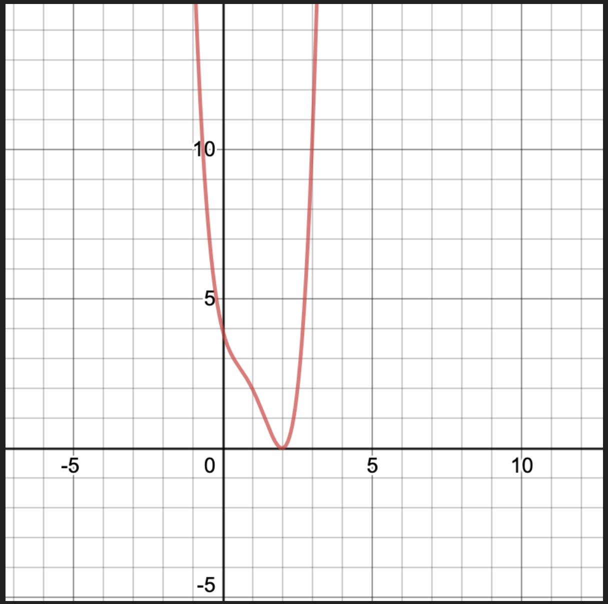
सिद्धिर्भवति कर्मजा

IIT Madras

ONLINE DEGREE

Example

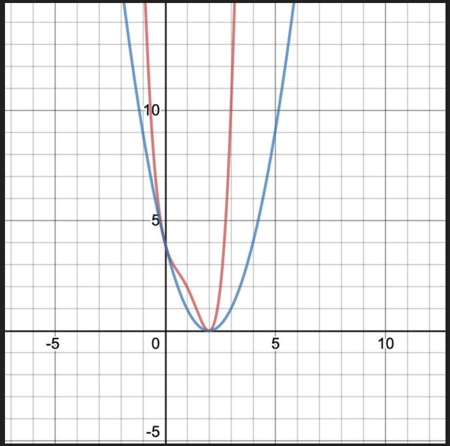
Use the graph of the function of degree 4 to identify the zeros of the function and their possible multiplicities.

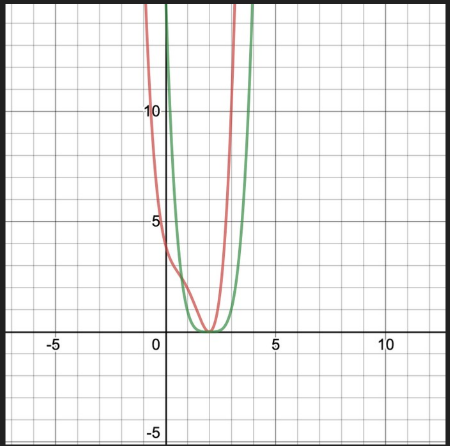


x = 2

x=2, even degree, 2 or 4

Hence, the function f(x) must have a factor $(x-2)^2$.





End-Behavior of Polynomials

As we have already observed, the behavior of polynomial function

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

is either increasing or decreasing as the the value of x increases which is mainly due to the fact that the leading terms dominate the behavior of polynomial. This behavior is known as End behavior of the function.

As observed in quadratic equations, if the leading term of a polynomial function, $a_n x^n$, is an even power function and $a_n > 0$, then as x increases or decreases, f(x) increases and is unbounded.
When the leading term is an odd power function, as x decreases, f(x) also decreases and is unbounded; as x increases, f(x) also increases and is unbounded.

End-Behavior of Polynomials

	Even Degree	Odd Degree
$a_n > 0$	$x \to \infty$, $f(x) \to \infty$ $x \to -\infty$, $f(x) \to \infty$	$x \to \infty$, $f(x) \to \infty$ $x \to -\infty$, $f(x) \to -\infty$
$a_n < 0$	$x \to \infty$, $f(x) \to -\infty$ $x \to -\infty$, $f(x) \to -\infty$	$x \to \infty$, $f(x) \to -\infty$ $x \to -\infty$, $f(x) \to \infty$