2.1

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7:15 AM

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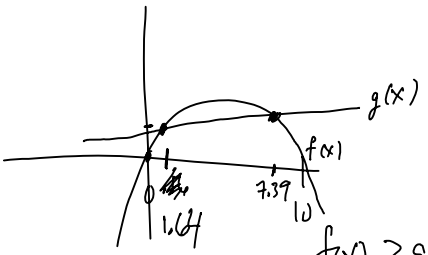
$f(x) = -.4x(x-10)$, $g(x) = .3x + 5$



$f(x) > g(x)$ on $(1.64, 7.39)$

to find intersections set $f(x) = g(x)$

$-.4x(x-10) = .3x + 5$

$-.4x^2 + 4x = .3x + 5$

$0 = .4x^2 - 3.7x + 5$

$x = \dfrac{3.7 \pm \sqrt{(3.7)^2 - 4(.4)(5)}}{2(.4)}$

$= \dfrac{3.7 \pm \sqrt{5.69}}{.8} =$

$\dfrac{3.7 \pm 2.39}{.8}$

$x = 1.64$ or $x = 7.39$

More about Polynomials §2.1

$f(x) = x^3 - 3x^2 + 2x - 5$

$g(x) = 7$

* a degree n polynomial has at most $n-1$ turning points *

* y-intercept of a polynomial is just the constant term *

* x-intercepts are solutions of $f(x) = 0$ — a degree n polynomial has at most n x-intercepts

& if n is odd, then it has at least 1 x-intercept *

the ends of every polynomial graph (deg ≥ 1) go toward ± ∞

- for odd degree polynomials the ends go in opposite directions e.g. $f(x) = x^3 - x^2 + 5x + 2$
- for even deg, the ends match.

$f(x) = -x^4 + 5x^3 + 10x - 2.$

as $x \to \infty$, $f(x) \to -\infty$

and as $x \to -\infty$, $f(x) \to -\infty$

} ends match.

Ex. Find x-int's $f(x) = x^3 - 3x^2 = x^2(x-3) = 0$

$x = 0$ or $x = 3$

{ domain of polynomials is all real #'s. (all poly's have y-intercepts)

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§2.1 Rational Functions $\left(= \frac{\text{poly}}{\text{poly}}\right)$

let small be nearly 0 (pos/neg) e.g. $-.001, .002$

let large be far from 0, e.g. $1{,}000{,}000$, 10^{13}, -10^{18}, 1000

$\frac{1}{\text{small}} = \text{large}$, $\quad \frac{\text{small}}{\text{large}} = \text{small}$

$\frac{1}{\text{large}} = \text{small}$, $\quad \frac{\text{large}}{\text{small}} = \text{large}$

$\frac{\text{small}}{\text{small}} = ?$ $\quad \frac{\text{large}}{\text{large}} = \frac{?}{?}$

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rational function $f(x) = \frac{p(x)}{q(x)}$ ← poly's ↙

domain is wherever $q(x) \neq 0$

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e.g. $f(x) = \dfrac{x^2+4}{x^2-1}$

$= \dfrac{x^2+4}{(x-1)(x+1)}$

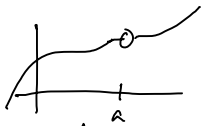
Domain: all real numbers except $x = \pm 1$.

(1) what happens as $x \to \pm\infty$

(2) what happens for x close to ± 1?

if $x = a$ is not in the domain of rational function then the graph will have one of the following

(a) a hole in the graph at $x = a$



(b) a vertical asymptote, e.g.