Challenge: Find the value of k for which the limit exists.

$$\lim_{x \to 4} \frac{x^2 - x + k}{x - 4}$$

$x^2 + bx + c$

$(x \quad)(\quad)$

How to evaluate limits algebraically:

- Direct Sub
- Factor / Massage
- Rationalize

Infinite Limits (1-5 and 3-5)

Function Dominance

For a fixed, large x-value, which is larger?

$$\frac{x^9+5000x^8+1000}{x^{10}-5000}$$

A

B

What grows faster? y = x or y = ln(x) ?

What grows faster? y = x or y = 2^x?

A

B

[redacted]

Exponentials dominate polynomials,
Polynomials dominate logarithms,
Among exponentials, larger bases dominate smaller,
Among polynomials, higher powers dominate lower,

[redacted]

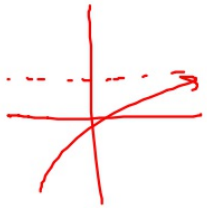
For very large x values, consider:

$$\lim_{x \to \infty} \frac{\ln\left(x^5\right)}{x^{.02}} = 0$$

~~Limits that Yield Infinity~~

$\lim_{x \to \infty} f(x)$ asks "what's y when x is huge?"

[Horizontal Asymptote]



ex/ $\lim_{x \to \infty} \frac{3x^{17} - 5}{2x^{18} + 2} = 0$

$\lim_{x \to \infty} \frac{5x^{20} - 2}{3x^{19} - 5} = \infty / \text{dne}$ (No. H.A.)

$\lim_{x \to \infty} \frac{3x^{50} - \cdots}{5x^{50} - \cdots} = 3/5$ ← same degree? Ratio of the leading Coeff.

Homework:
p. 88: 4, 25, 26, 33-45 (multiples of 3)

p. 202: 13-22

F-BF2
F-LF1