Wednesday - Week 3 - Finish Chapter 6 - Fractions Factoring & Equations

1. simplifying compound fractions

2. multiplying fractions by simplifying first

3. solve linear equations

4. applications of #3

5. limits & applications

HW #5 Simplify into a single fraction

$$\frac{\dfrac{2}{x-1} + 1\left(\dfrac{x-1}{x-1}\right)}{\dfrac{3}{x-1} - 1\left(\dfrac{x-1}{x-1}\right)} = \frac{\dfrac{2}{x-1} + \dfrac{x-1}{x-1}}{\dfrac{3}{x-1} - \dfrac{x-1}{x-1}} = \frac{\dfrac{2+x-1}{x-1}}{\left[\dfrac{3-(x-1)}{x-1}\right]}$$

$$= \frac{x+1}{\cancel{x-1}} \cdot \left[\frac{\cancel{x-1}}{3-(x-1)}\right] = \frac{x+1}{3-x+1} = \frac{x+1}{4-x}$$

only flip factors, not terms!

$$\frac{A \cdot B}{\left(\frac{1}{c}\right) \cdot D} = \frac{c}{1} \cdot \frac{A \cdot B}{D} = \frac{ABC}{D}$$

$\frac{1}{c}$ is a factor

$$\frac{A \cdot B}{\frac{1}{c} + D} \neq \frac{c}{1} \cdot \frac{A \cdot B}{D}$$

$\frac{1}{c}$ is a term

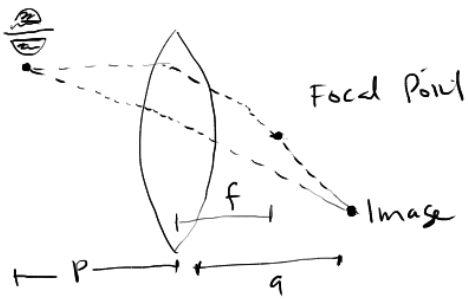
Ex Multiplying Fractions by Simplifying 1st

$$\frac{4x^2-36}{x^3-25x} \cdot \frac{7x-35}{3x^2+9x} = \frac{4(x^2-9)}{x(x^2-25)} \cdot \frac{7(x-5)}{3x(x+3)}$$

$$= \frac{4(x-3)\cancel{(x+3)}}{x\cancel{(x-5)}(x+5)} \cdot \frac{7\cancel{(x-5)}}{3x\cancel{(x+3)}}$$

$$= \frac{4(x-3)\cdot 7}{x(x+5)\cdot 3x} = \boxed{\frac{28(x-3)}{3x^2(x+5)}}$$

Solve equations involving fractions



$$f = \frac{pq}{p+q}$$

Suppose you want to find q.
Solve for q:

1. get q's all on the level.

$$\frac{f}{1} = \frac{pq}{p+q} \implies f(p+q) = 1 \cdot pq$$

2. distribute & collect terms involving q on same side

$$fp + fq = pq$$

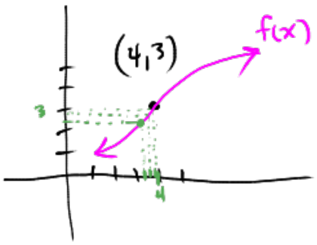
$$fp = pq - fq$$

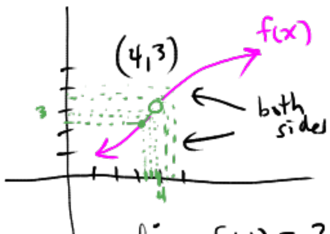
$$fp = q(p-f)$$

undo what's done to q

$$\boxed{\frac{fp}{p-f} = q}$$

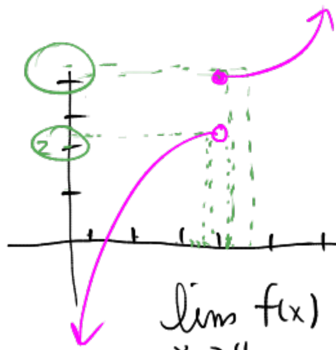
Limits: Ch. 2.3.



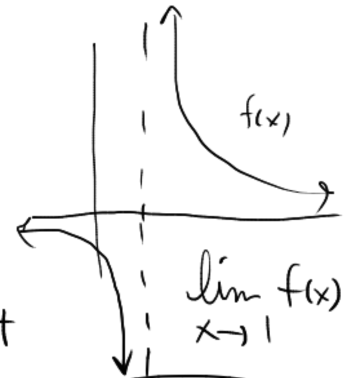


$$\lim_{x \to 4} f(x) = 3$$

" as x approaches 4, the corresponding f(x) approaches 3.



$\lim_{x \to 4} f(x) =$ Does not exist



$\lim_{x \to 1} f(x)$ DNE.

asymptote

How to find Limits

$$\lim_{x \to a} f(x).$$

- 1st try to plug in a. If you get a real number, you've found the limit.

- Otherwise masaage f(x) with algebra

- $\lim_{x \to 1} 3x^2 - 1 = 3(1)^2 - 1 = 2$ ✓

- $\lim_{x \to 2} \frac{\sqrt{x-1} - 1}{x-2}$, try $x=2$. $\frac{\sqrt{2-1} - 1}{2-2} = \frac{\sqrt{1} - 1}{2-2} = \frac{0}{0}$ not real #

Rationalize $(\sqrt{x-1})(\sqrt{x-1}) = x-1$

$$\lim_{x \to 2} \frac{\sqrt{x-1} - 1}{x-2} \left(\frac{\sqrt{x-1} + 1}{\sqrt{x-1} + 1} \right) = \lim_{x \to 2} \frac{x-1-1}{(x-2)(\sqrt{x-1} + 1)}$$

$$= \lim_{x \to 2} \frac{\cancel{x-2}}{\cancel{x-2}(\sqrt{x-1} + 1)}$$

$$= \lim_{x \to 2} \frac{1}{\sqrt{x-1} + 1} = \frac{1}{2}$$

$$\frac{\sqrt{x-1} - 1}{x-2}$$