MA 161 Wk2 Th

$\frac{\frac{A}{C}}{\frac{B}{C}} = \frac{A}{B}$

#21

$$\frac{\frac{6}{r+3} + \frac{7}{r-3}}{\frac{6}{r+3} - \frac{8}{r+3}} = \frac{\frac{6r-18+7r+21}{r^2-9}}{\frac{6r+18-8r+24}{r^2-9}}$$

$$= \frac{13r+3}{-2r+42}$$

#42

Find the difference quotient for the function $f(x) = \frac{2}{x-3}$. Simplify your answer as much as possible.

$$\frac{f(x+h)-f(x)}{h} = \frac{\quad}{\quad}$$

$f(x+h) = \frac{2}{(x+h)-3}$

$f(4) = \frac{2}{4-3}$

$f(11) = \frac{2}{11-3}$

$f(\text{i hate math}) = \frac{2}{\text{i hate math} - 3}$

$$\frac{f(x+h)-f(x)}{h} = \left(\frac{x-3}{x-3}\right)\frac{2}{x+h-3} - \frac{2}{x-3}\left(\frac{x+h-3}{x+h-3}\right) \Big/ h$$

$$= \frac{2x-6-2x-2h+6}{(x-3)(x+h-3)} \Big/ h$$

$$\left(\frac{-2h}{(x-3)(x+h-3)}\right) \Big/ \left(\frac{h}{1}\right)$$

$$= \frac{-2h}{(x-3)(x+h-3)} \cdot \frac{1}{h} = \frac{-2}{(x-3)(x+h-3)}$$

ww #3

$$f(x) = \frac{7}{x \ln(7x)} .$$

Domain:

- can't ÷ by 0
- no $\sqrt{\ }$ of negatives
- can't log a negative # or 0

① $x \cdot \ln(7x) = 0$

$x = 0$ or $\ln 7x = 0 \Rightarrow e^{\ln 7x} = e^{0}$

throw out

$7x = 1$

$x = 1/7$

② $7x > 0$

$x > 0$

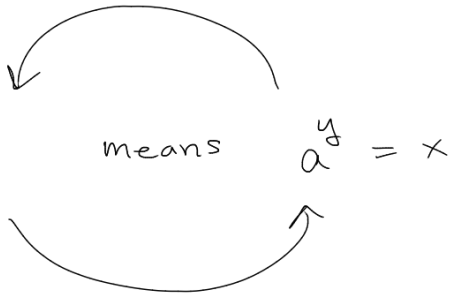
ANS $(0, \frac{1}{7}) \cup (\frac{1}{7}, \infty)$

All about logarithms

What are they?

- change of scale
- Def'n

$\log_a x = y$ means $a^y = x$



Ex If $a^y = x$, "hit w/ $\log_a$"

$\log_a a^y = \log_a x$

$y = \log_a x$

3 Properties

① $\log(x \cdot y) = \log x + \log y$

check!

$10^{\log(x \cdot y)} = x \cdot y$

$10^{(\log x + \log y)} = 10^{\log x} \cdot 10^{\log y}$ ☺

$= x \cdot y$

② $\log\left(\frac{x}{y}\right) = \log x - \log y$

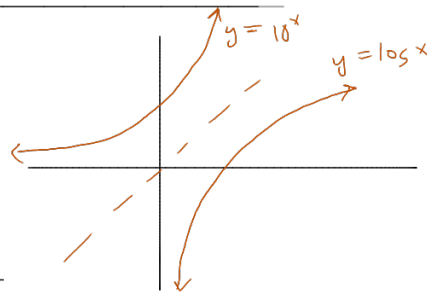
log I'm — log You = log (I'm / You)

③ $\log(A^c) = c \cdot \log A$

when you raise a base/power to another power, you multiply the powers

Solve Log / Exp Equations

$$\log(x-5) + \log(x-4) = 0$$



solve:
(isolate x)

① $\Rightarrow \log\big((x-5)(x-4)\big) = 0$

② $10^{\log((x-5)(x-4))} = 10^0$

③ $(x-5)(x-4) = 1$

$x^2 - 9x + 20 = 1$

④ $x^2 - 9x + 19 = 0$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$= \frac{9 \pm \sqrt{81-4(19)}}{2} = \frac{9 \pm \sqrt{5}}{2}$$

⑤ check: $x-5$ & $x-4$ are > 0

$\frac{9+\sqrt{5}}{2} - 5$ & $\frac{9+\sqrt{5}}{2} - 4 \Rightarrow$ both + they'll work

but $\frac{9-\sqrt{5}}{2} - 4 < 0 \Rightarrow x = \frac{9-\sqrt{5}}{2}$ doesn't work