Good afternoon: warm up in notebooks.
Evaluate the limit. Do as little work as needed.

$$\left\{ \frac{d}{dx} x^n = n x^{n-1} \right\}$$

$$\lim_{\Delta x \to 0} \frac{(x+\Delta x)^3 - 3(x+\Delta x)^4 + 2(x+\Delta x) - \underbrace{(x^3 - 3x^4 + 2x)}_{f(x)}}{\Delta x}$$

$f'(x)$?

$f(x)$

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

$$\boxed{3x^2 - 12x^3 + 2}$$

Reminders: tutoring TODAY next assessment: Friday

Visually Random Grouping

- keeps things fresh
- collaborate with people you may not otherwise
- elimination of social barriers

$-1x^1 \rightarrow -1x^0$

NOTES

Use the limit definition of derivative to find the slope of a line tangent to

$f(x)=2x^2-x+1$ at the point (2,7) $f' = 4x-1$

$2 \cdot 2x^1$

$$\lim_{\Delta x \to 0} \frac{f(x+\Delta x)-f(x)}{\Delta x}$$

$$\frac{2(x+\Delta x)^2-(x+\Delta x)+1-(2x^2-x+1)}{\Delta x}$$

$$2(x^2+2x\Delta x+\Delta x^2)-x-\Delta x+1-2x^2+x-1$$

$$\lim_{\Delta x \to 0} \frac{\cancel{2x^2}+4x\Delta x+2\Delta x^2-\cancel{x}-\Delta x\cancel{+1}\cancel{-2x^2}\cancel{+x}\cancel{-1}}{\Delta x}$$

$$\lim_{\Delta x \to 0} \frac{4x\Delta x+2\Delta x^2-\Delta x}{\Delta x} \Rightarrow \lim_{\Delta x \to 0} \frac{\cancel{\Delta x}(4x+2\Delta x-1)}{\cancel{\Delta x}}$$

$$\lim_{\Delta x \to 0} 4x+2\Delta x-1$$

$$4x+2(0)-1$$

$$f'(x) = 4x-1$$

$$f'(2) = 4(2)-1 = 7$$

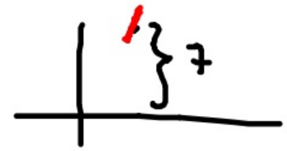
The Derivative *As* a Function

$f(x) = 2x^2 - x + 1$

$f(2) = 7$

f (x) : input number, output height (y-value)

$f(x) = 2x^2 - x + 1$

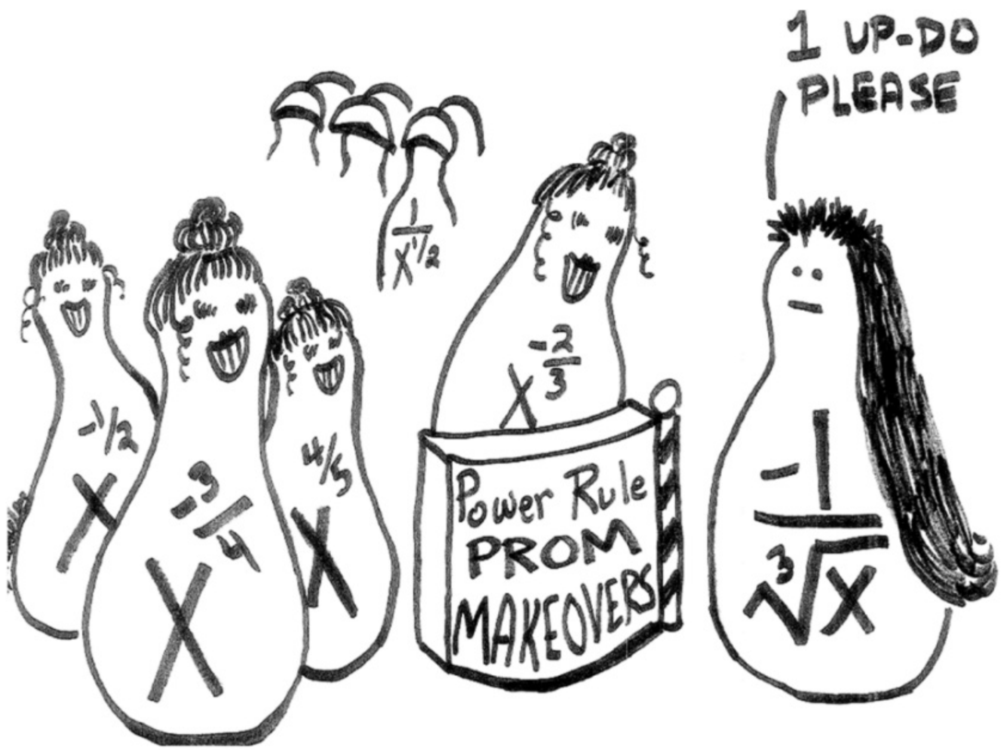


f '(x) : input number, output Slope.

$f'(x) = 4x - 1$

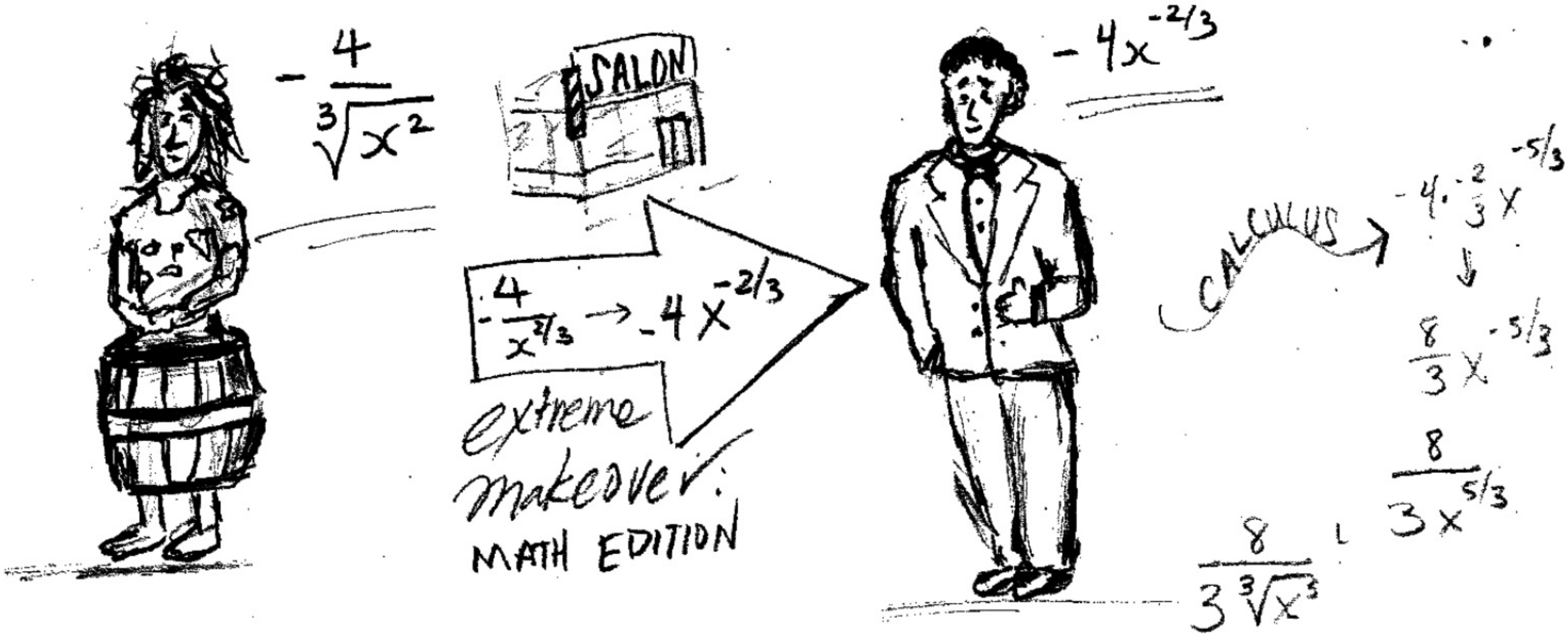
$f'(2) = 4(2) - 1$

$= 7$



To use the Power Rule
a function/term
must be in this form:

$$ax^n$$


$-\frac{4}{\sqrt[3]{x^2}}$
SALON
$-\frac{4}{x^{2/3}} \rightarrow -4x^{-2/3}$
extreme makeover:
MATH EDITION
$-4x^{-2/3}$
CALCULUS
$-4 \cdot -\frac{2}{3}x^{-5/3}$
$\frac{8}{3}x^{-5/3}$
$\frac{8}{3x^{5/3}}$
$\frac{8}{3\sqrt[3]{x^5}}$

Find f ' (x) for $f(x) = \dfrac{3}{\sqrt[4]{x^5}}$

$\sqrt[a]{x^b} \rightleftarrows x^{\frac{b}{a}}$

$x^{-n} \rightleftarrows \dfrac{1}{x^n}$

$f(x) = 3 \cdot \dfrac{1}{x^{5/4}}$

$f(x) = 3 \cdot x^{-5/4}$

power rule

$f'(x) = \underbrace{3 \cdot -\tfrac{5}{4}}\, x^{-9/4}$

$-\dfrac{15}{4} \cdot \dfrac{1}{x^{9/4}} \Rightarrow -\dfrac{15}{4\sqrt[4]{x^9}}$

Due Weds:
p. 114 #5-18, 25-35