

WARMUP

Recall $b^{m/n} = \sqrt[n]{b^m}$

$$b^{-n} = \frac{1}{b^n}$$

$$b^{-m/n} = \frac{1}{\sqrt[n]{b^m}}$$

Rewrite each in radical form

$$1) x^{3/2} = \sqrt{x^3} \quad (3x)^{7/3} = \sqrt[3]{(3x)^7}$$

$$2) 3x^{7/3} = 3\sqrt[3]{x^7}$$

$$3) 5x^{-2/3} = \frac{5}{x^{2/3}} = \frac{5}{\sqrt[3]{x^2}}$$

Rewrite each in rational form

$$4) \sqrt[3]{x^4} = x^{4/3}$$

$$5) \frac{4}{\sqrt{x^5}} = 4x^{-5/2}$$

Section 3.1 Derivative Rules

$$\frac{d}{dx}[c] = 0$$

$$\frac{d}{dx}[x] = 1 \quad \frac{d}{dx}[cx] = c$$

$$\frac{d}{dx}[cf(x)] = cf'(x)$$

$$\frac{d}{dx}[x^n] = nx^{n-1}$$

$$\frac{d}{dx}[f(x) \pm g(x)] = f'(x) \pm g'(x)$$

TRY: Find $f'(x)$ if $f(x) = 3x^4 + 7x^3 - 6x + 2$

$$f'(x) = 12x^3 + 21x^2 - 6$$

ex: $\frac{d}{dx} [3^x]$ x is in the exponent
so we can't use the
rules we just learned
(we'll learn this in 3.2)

ex: $\frac{d}{dx} [x^{3.2}] = 3.2x^{2.2}$

ex: $\frac{d}{dx} [9x^{1.1}] = 9.9x^{0.1}$

ex: $y = \sqrt{x}$ find y'

$$y = x^{\frac{1}{2}}$$

$$\frac{1}{2} - 1 = \frac{1}{2} - \frac{2}{2} = -\frac{1}{2}$$

$$y' = \frac{1}{2} x^{-\frac{1}{2}}$$

← no negative exponents in our
answers

$$y' = \frac{1}{2} \cdot \frac{1}{x^{1/2}}$$

$$y' = \frac{1}{2\sqrt{x}}$$

← start with radical,
end with radical

ex: $y = \sqrt[3]{x^5} = x^{5/3}$

$$y' = \frac{5}{3} x^{2/3} = \frac{5}{3} \sqrt[3]{x^2}$$

ex: Find $h'(\theta)$ if $h(\theta) = \frac{1}{\sqrt[3]{\theta}} = \frac{1}{\theta^{\frac{1}{3}}} = \theta^{-\frac{1}{3}}$

$$h'(\theta) = -\frac{1}{3} \theta^{-\frac{4}{3}} = -\frac{1}{3\theta^{\frac{4}{3}}}$$

$$= -\frac{1}{3\sqrt[3]{\theta^4}}$$

p11 3-11 odd, 13-16, 18, 20