WARMUP

Recall

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

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

Rewrite each expression in radical form

1) $x^{3/2} = \sqrt{x^3}$

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 expression in rational form

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

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

Section 3.1 Derivative Rules

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

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

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

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

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

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

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

$\frac{d}{dx}\left[3^{\sqrt{x}}\right]$ — x is in the exponent so none of our rules apply

$$\frac{d}{dx}\left[x^{3.2}\right] = 3.2x^{2.2}$$

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

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

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

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

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

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