

Calculus I

Derivative of $\frac{a}{x} = ax^{-1}$

Todor Milev

2019

Example (Constant Multiple Rule, Power Rule, Negative Exponent)

Find the derivative of $t = \frac{2\pi}{x^4}$.

Example (Constant Multiple Rule, Power Rule, Negative Exponent)

Find the derivative of $t = \frac{2\pi}{x^4}$.

$$t = (2\pi) (x^{-4}) .$$

Example (Constant Multiple Rule, Power Rule, Negative Exponent)

Find the derivative of $t = \frac{2\pi}{x^4}$.

$$t = (2\pi) (x^{-4}) .$$

$$\frac{dt}{dx} = \frac{d}{dx} [(2\pi) (x^{-4})]$$

Example (Constant Multiple Rule, Power Rule, Negative Exponent)

Find the derivative of $t = \frac{2\pi}{x^4}$.

$$t = (2\pi) (x^{-4}) .$$

$$\frac{dt}{dx} = \frac{d}{dx} \left[(2\pi) (x^{-4}) \right]$$

Constant Multiple Rule: $= (2\pi) \frac{d}{dx} (x^{-4})$

Example (Constant Multiple Rule, Power Rule, Negative Exponent)

Find the derivative of $t = \frac{2\pi}{x^4}$.

$$t = (2\pi) (x^{-4}) .$$

$$\frac{dt}{dx} = \frac{d}{dx} [(2\pi) (x^{-4})]$$

Constant Multiple Rule: $= (2\pi) \frac{d}{dx} (x^{-4})$

$$= (2\pi) (?)$$

Example (Constant Multiple Rule, Power Rule, Negative Exponent)

Find the derivative of $t = \frac{2\pi}{x^4}$.

$$t = (2\pi) (x^{-4}) .$$

$$\frac{dt}{dx} = \frac{d}{dx} \left[(2\pi) (x^{-4}) \right]$$

$$\begin{aligned} \text{Constant Multiple Rule: } &= (2\pi) \frac{d}{dx} (x^{-4}) \\ &= (2\pi) (-4x^{-5}) \end{aligned}$$

Example (Constant Multiple Rule, Power Rule, Negative Exponent)

Find the derivative of $t = \frac{2\pi}{x^4}$.

$$t = (2\pi) (x^{-4}) .$$

$$\frac{dt}{dx} = \frac{d}{dx} [(2\pi) (x^{-4})]$$

$$\begin{aligned} \text{Constant Multiple Rule: } &= (2\pi) \frac{d}{dx} (x^{-4}) \\ &= (2\pi) (-4x^{-5}) \\ &= -\frac{8\pi}{x^5} . \end{aligned}$$