

Worked ex.: Find $\frac{dy}{dx}$ of $y = 7^{x^2-x}$

$$y = 7^{x^2-x}$$

$$\log_7 y = \log_7 7^{x^2-x} = x^2-x$$

$$\log_a b (?)$$

$$\log_a b = c$$

$$b = a^c$$

$$\ln b = \ln a^c = c \ln a$$

$$c = \frac{\ln b}{\ln a}$$

$$\frac{\ln y}{\ln 7} = x^2-x$$

$$\ln 7$$

$$\ln y = \ln 7 \cdot (x^2-x)$$

$$\frac{d}{dx} (\ln y) = \frac{d}{dx} (\ln 7 \cdot (x^2-x))$$

$$\frac{1}{y} \frac{dy}{dx} = \ln 7 (2x-1)$$

$$\frac{dy}{dx} = \ln 7 (2x-1) y$$

$$\frac{dy}{dx} = \ln 7 (2x-1) 7^{x^2-x}$$