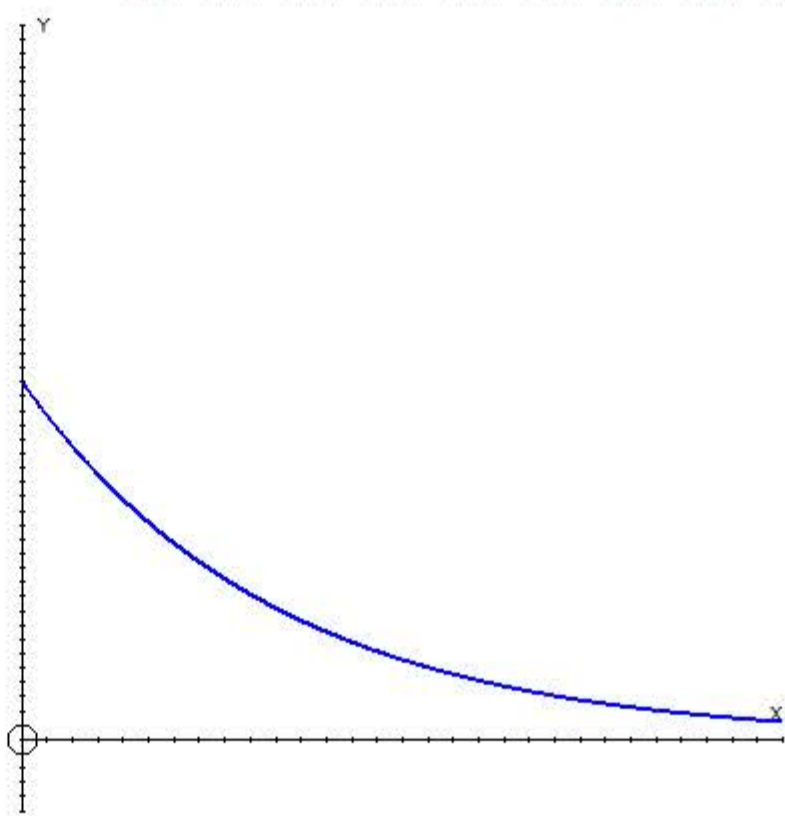
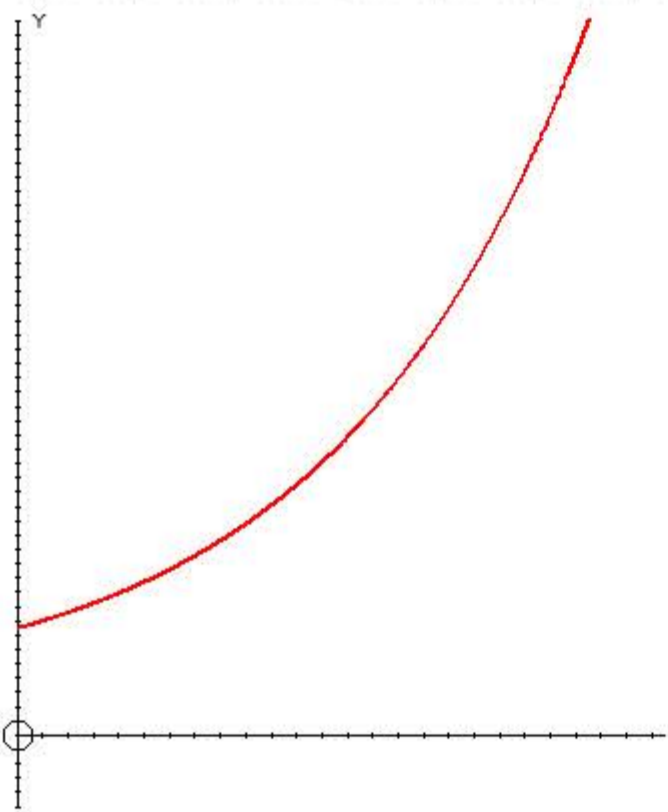


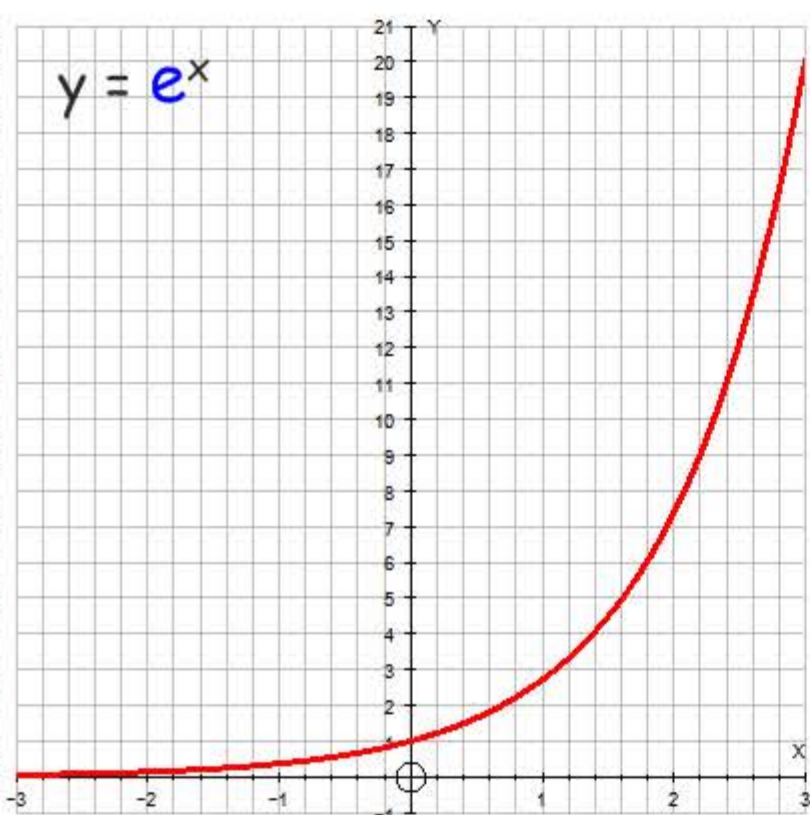
# Exponential Growth and Decay

$$P = P_0 e^{rt}$$

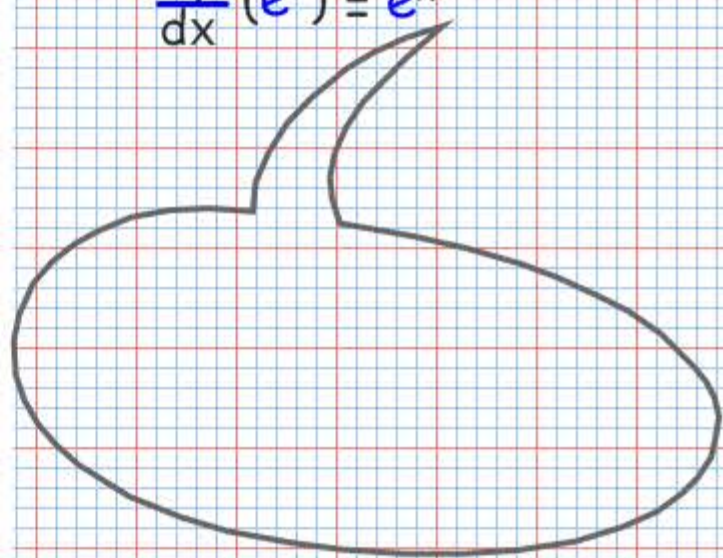
$$F_t = F_0 e^{kt}$$



## Differentiation of Exponential Function



$$\frac{dy}{dx} (e^x) = e^x$$



## Chain Rule for Differentiation



for a function  $F(x) = f(g(x))$  differential is  $F'(x) = f'(g(x)) \times g'(x)$

Examples

$$\frac{dy}{dx} (e^x) =$$

$$\frac{dy}{dx} (e^{ax}) =$$

$$\frac{dy}{dx} (e^{x^2}) =$$

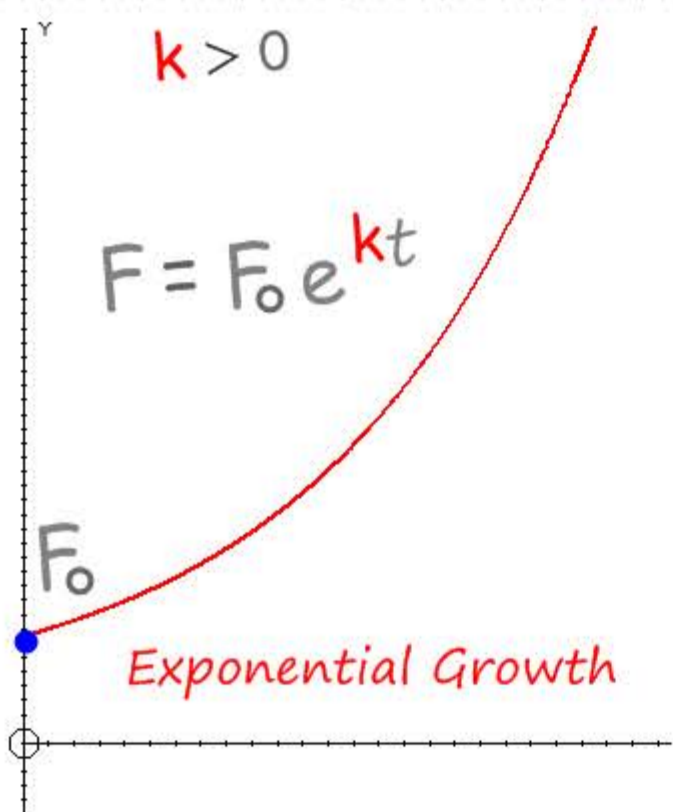
$$\frac{dy}{dx} (e^{5x+2}) =$$

$$\frac{dy}{dx} (7e^{4x^3}) = \quad \times \quad \times \quad =$$

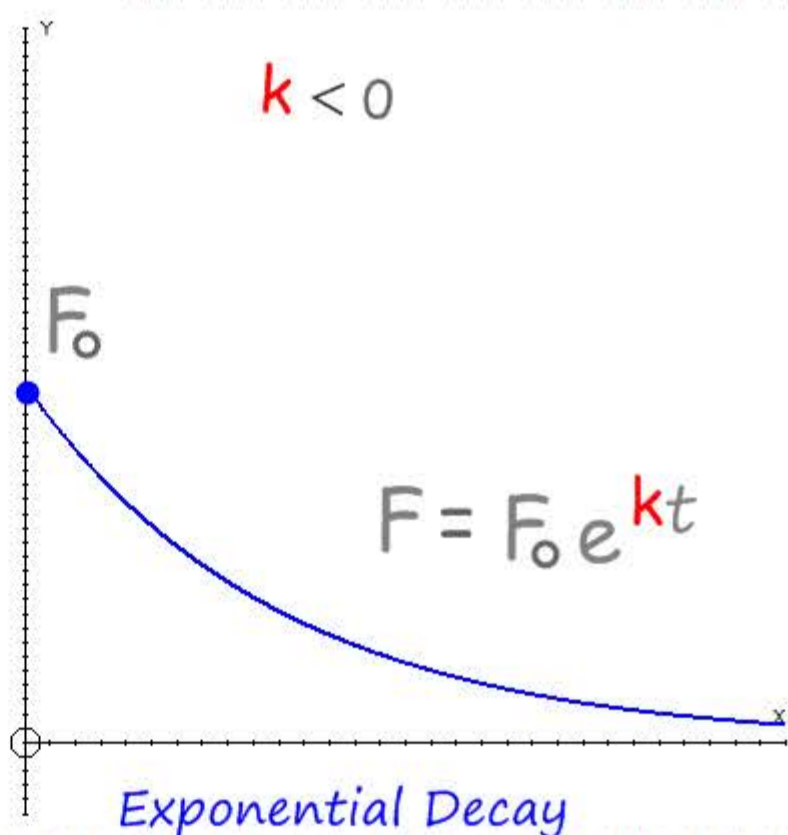
# Exponential Growth and Decay

$$P = P_0 e^{rt}$$

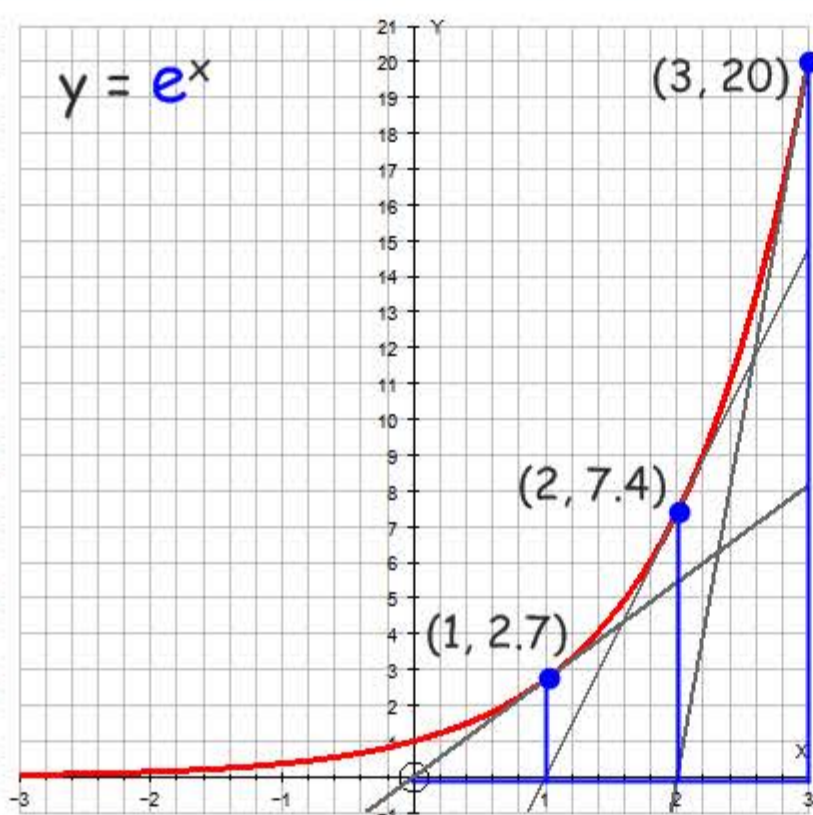
$$F_t = F_0 e^{kt}$$



$$F = F_0 e^{kt}$$



## Differentiation of Exponential Function



$$\frac{dy}{dx} (e^x) = e^x$$

gradient of tangent at a point equals the value of the function at that point

Composite Function

## Chain Rule for Differentiation

for a function  $F(x) = f(g(x))$  differential is  $F'(x) = f'(g(x)) \times g'(x)$

Examples

$$\frac{dy}{dx} (e^x) = e^x$$

$$\frac{dy}{dx} (e^{ax}) = ae^{ax}$$

$$\frac{dy}{dx} (e^{x^2}) = 2x(e^{x^2})$$

$$\frac{dy}{dx} (e^{5x+2}) = 5e^{5x+2}$$

$$\frac{dy}{dx} (7e^{4x^3}) = 7 \times e^{4x^3} \times 12x^2 = 84x^2 e^{4x^3}$$