$$y_1 = 3 \cdot 2^x$$

$\Rightarrow$ take natural log b/c variable in exponent

$$\ln y_1 = \ln(3 \cdot 2^x) = \ln 3 + \ln 2^x$$

$$\ln y_1 = \ln 3 + x \ln 2$$

$$\frac{d}{dx} \ln y_1 = \frac{d}{dx} \ln 3 + \frac{d}{dx}(x \ln 2)$$

$$\frac{1}{y_1} \frac{dy_1}{dx} = 0 + \ln 2$$

$$\boxed{\frac{dy_1}{dx} = (3 \cdot 2^x) \ln 2}$$

$$y_2 = 2 \cdot x^3$$

$$\boxed{\frac{dy_2}{dx} = 6x^2}$$

$$y_3 = 3 \cdot x^{2x+3}$$

$$\ln y_3 = \ln(3 \cdot x^{2x+3}) = \ln 3 + \ln x^{2x+3} = \ln 3 + (2x+3) \ln$$

(differentiate) $$\frac{1}{y_3} \frac{dy_3}{dx} = 0 + (2x+3)\left(\frac{1}{x}\right) + (2)(\ln x)$$

$$\boxed{\frac{dy_3}{dx} = (3x^{2x+3})\left[\frac{2x+3}{x} + 2 \ln x\right]}$$

$$f'(x) = \frac{dy_1}{dx} + \frac{dy_2}{dx} + \frac{dy_3}{dx}$$

$$= (3 \cdot 2^x)(\ln 2) + (6x^2) + (3x^{2x+3})\left[\frac{2x+3}{x} + 2 \ln x\right]$$