

1. Find $\frac{dy}{dx}$ for each of the following:

(iv) $y = e^{2x+4}$

$$y = e^{2x+4}$$

$$\frac{dy}{dx} = (e^{2x+4})(2)$$

$$= 2e^{2x+4}$$

(v) $y = e^{x^2+3x}$

$$y = e^{x^2+3x}$$

$$\frac{dy}{dx} = (e^{x^2+3x})(2x+3)$$

(vi) $y = e^{\sin x}$

$$y = e^{\sin x}$$

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

3. Find $\frac{dy}{dx}$ for each of the following:

(i) $y = e^{2x} \sin x$

(ii) $y = (e^x - 1)^2$

(iii) $y = \frac{e^{2x+1}}{e^x}$

Product Rule

$$\frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$u = e^{2x}$$

$$\frac{du}{dx} = 2e^{2x}$$

$$v = \sin x$$

$$\frac{dv}{dx} = \cos x$$

$$y = (e^{2x})(\sin x)$$

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

$$= e^{2x}(\cos x + 2\sin x)$$