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$$\text{iv) } y = 3 \sin 2x - 2 \cos 2x + \tan \frac{x}{3}$$

$$\frac{dy}{dx} = 3(2 \cos 2x) - 2(-2 \sin 2x) + \frac{1}{3} \sec^2 \frac{x}{3}$$

$$\frac{dy}{dx} = 6 \cos 2x + 4 \sin 2x + \frac{1}{3} \sec^2 \frac{x}{3}$$

$$\text{v) } \begin{matrix} e^{2x} & \tan 3x \\ \uparrow & \uparrow \\ u & v \end{matrix}$$

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

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

$$\frac{dv}{dx} = 3 \sec^2 3x$$

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

$$= 2e^{2x} \tan 3x + 3e^{2x} \sec^2 3x$$

$$\text{vi) } y = \frac{\sin 5x}{x^3 + 3x + 4}$$

$$\begin{matrix} \leftarrow u \\ \leftarrow v \end{matrix}$$

$$\frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

$$\frac{du}{dx} = 5 \cos 5x$$

$$\frac{dv}{dx} = 3x^2 + 3$$

$$= \frac{(x^3 + 3x + 4)(5 \cos 5x) - (\sin 5x)(3x^2 + 3)}{(x^3 + 3x + 4)^2}$$