

Quiz 5

1. [5 points] Find a formula for $f'(x)$ if $f(x) = \sec^2(xe^{5x})$.

$$\begin{aligned}
 & \frac{d}{dx} [\sec^2(xe^{5x})] \\
 &= 2 \sec(xe^{5x}) \frac{d}{dx} [\sec(xe^{5x})] \\
 &= 2 \sec(xe^{5x}) \sec(xe^{5x}) \tan(xe^{5x}) \frac{d}{dx} [xe^{5x}] \\
 &= 2 \sec^2(xe^{5x}) \tan(xe^{5x}) (e^{5x} + 5xe^{5x}) \\
 &= \boxed{2(1+5x)e^{5x} \sec^2(xe^{5x}) \tan(xe^{5x})}
 \end{aligned}$$

2. [5 points] Suppose that

$$x^3 + y^3 + 4y = 2.$$

Find a formula for $\frac{dy}{dx}$ in terms of x and y .

$$3x^2 + 3y^2 \frac{dy}{dx} + 4 \frac{dy}{dx} = 0$$

$$(3y^2 + 4) \frac{dy}{dx} = -3x^2$$

$$\boxed{\frac{dy}{dx} = -\frac{3x^2}{3y^2 + 4}}$$