Symbolab

Solution

$$\frac{\partial}{\partial y}\left(x^3e^{-y}+y^3\sec\left(\sqrt{x}\right)\right)=-x^3e^{-y}+3y^2\sec\left(\sqrt{x}\right)$$

Steps

$$\frac{\partial}{\partial y}\left(x^3e^{-y}+y^3\sec\left(\sqrt{x}\right)\right)$$

Treat x as a constant

Apply the Sum/Difference Rule: $(f\pm g)'=f'\pm g'$

$$=\frac{\partial}{\partial y}\left(x^3e^{-y}\right)+\frac{\partial}{\partial y}\left(y^3\sec\left(\sqrt{x}\right)\right)$$

$$\frac{\partial}{\partial y}\left(x^3e^{-y}\right)=-x^3e^{-y}$$

Hide Steps

$$\frac{\partial}{\partial y}\left(x^3e^{-y}\right)$$

Take the constant out: $(a\cdot f)'=a\cdot f'$

$$=x^3\frac{\partial}{\partial y}\left(e^{-y}\right)$$

Apply the chain rule: $\frac{df(u)}{dx}=\frac{df}{du}\cdot\frac{du}{dx}$

$f=e^u,\ u=-y$

$$=x^3\frac{\partial}{\partial u}\left(e^u\right)\frac{\partial}{\partial y}(-y)$$

$$\frac{\partial}{\partial u}\left(e^u\right)=e^u$$

Hide Steps

$$\frac{\partial}{\partial u}\left(e^u\right)$$

Apply the common derivative: $\frac{\partial}{\partial u}\left(e^u\right)=e^u$

$= e^u$

$\frac{\partial}{\partial y}(-y) = -1$

Hide Steps

$\frac{\partial}{\partial y}(-y)$

Take the constant out: $(a \cdot f)' = a \cdot f'$

$= -\frac{\partial}{\partial y}(y)$

Apply the common derivative: $\frac{\partial}{\partial y}(y) = 1$

$= -1$

$= x^3 e^u(-1)$

Substitute back $u = -y$

$= x^3 e^{-y}(-1)$

Simplify

$= -x^3 e^{-y}$

$\frac{\partial}{\partial y}\left(y^3 \sec(\sqrt{x})\right) = 3y^2 \sec(\sqrt{x})$

Hide Steps

$\frac{\partial}{\partial y}\left(y^3 \sec(\sqrt{x})\right)$

Take the constant out: $(a \cdot f)' = a \cdot f'$

$= \sec(\sqrt{x})\frac{\partial}{\partial y}\left(y^3\right)$

Apply the Power Rule: $\frac{d}{dx}\left(x^a\right) = a \cdot x^{a-1}$

$= \sec(\sqrt{x}) \cdot 3y^{3-1}$

Simplify

$= 3y^2 \sec(\sqrt{x})$

$= -x^3 e^{-y} + 3y^2 \sec(\sqrt{x})$

Symbolab