

Name: _____

Date: _____

Learning Goal 3.2	Applying derivatives to trigonometric and exponential functions.
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More Questions – Solutions**Example** Differentiate.

a. $y = 10^{\tan x}$

$$\frac{dy}{dx} = (10^{\tan x} \times \ln(\tan x)) \times \sec^2 x$$

c. $f(x) = x^4 4^x$

$$\begin{aligned} f'(x) &= 4x^3 4^x + x^4 4^x \ln 4 \\ &= x^3 4^{x+1} + x^4 4^x \ln 4 \\ &= x^3 4^x (4 + x \ln 4) \end{aligned}$$

e. $y = \frac{x}{10^x + 5}$

$$\frac{dy}{dx} = \frac{(10^x + 5)(1) - x(10^x \ln 10)}{(10^x + 5)^2}$$

g. $g(t) = \ln(t^2 e^{-t^2})$

$$\begin{aligned} g'(t) &= \frac{1}{t^2 e^{-t^2}} \times (2te^{-t^2} + t^2 e^{-t^2} \times -2t) \\ &= \frac{e^{t^2}}{t^2} \times \left(\frac{2t}{e^{t^2}} - \frac{2t^3}{e^{t^2}} \right) \\ &= \frac{e^{t^2}}{t^2} \times \left(\frac{2t - 2t^3}{e^{t^2}} \right) \\ &= \frac{2t(1 - t^2)}{t^2} \\ &= \frac{2(1 - t^2)}{t} \end{aligned}$$

b. $y = 2^{3^x}$

$$\begin{aligned} \frac{dy}{dx} &= (2^{3^x} \times \ln 3^x) \times (3^x \times \ln 3) \\ &= x 2^{3^x} 3^x \ln^2 3 \end{aligned}$$

d. $g(x) = e^{2x^2+x}$

$$g'(x) = e^{2x^2+x} (4x + 1)$$

f. $y = \log_2(\sqrt{x-5})$

$$\begin{aligned} \frac{dy}{dx} &= \frac{1}{\ln 2 \sqrt{x-5}} \times \frac{1}{2\sqrt{x-5}} \\ &= \frac{1}{2(x-5) \ln 2} \end{aligned}$$

h. $y = \frac{e^{4x}}{x}$

$$\begin{aligned} \frac{dy}{dx} &= \frac{x(e^{4x} \times 4) - e^{4x}(1)}{x^2} \\ &= \frac{e^{4x}(4x - 1)}{x^2} \end{aligned}$$