

*University of Lethbridge*  
Department of Mathematics and Computer Science  
**MATH 1560 - Tutorial #4**  
Monday, February 5

Some additional practice (copy these into your notes but do not submit anything):

1. Compute the derivatives of the following functions using the chain rule:

(a)  $f(x) = \ln(\sqrt{x^4 + 3x^2})$       (b)  $g(x) = \sin(e^{x^3})$       (c)  $h(x) = e^{\sin(\sqrt{x^2+1})}$

2. Compute  $\frac{dy}{dx}$  using implicit differentiation, if:

(a)  $(x^2 + y^2)^2 = x^2 - y^2$       (b)  $\sqrt{xy} = x^2 - 3y$       (c)  $x^3 \sin(xy^2) = 3$

3. Compute  $f'(x)$  using logarithmic differentiation, if:

(a)  $f(x) = (x^2 + 1)^x$       (b)  $f(x) = \sqrt{\frac{e^{x^3}(x-4)^7}{(x^2+1)^3 \sin^3(x)}}$

1. Compute the derivative of the following functions:

(a)  $f(x) = \tan(x^3 + x)$

(b)  $g(x) = \sqrt{e^{x^4} + 1}$

2. Compute the **second** derivative of the following functions:

(a)  $f(x) = \tan(x^2)$

(b)  $g(x) = e^{\sec(x)}$

3. Compute the derivative of  $f(x) = \ln \left( \sqrt[3]{\frac{x^4(x-4)^5}{e^{3x+1}(x^2+1)^7}} \right)$ . (First use log properties)

4. Use implicit differentiation to find the equation of the tangent line to the curve  $(x+y^3)^2 = 4x^2y$  at the point  $(1,1)$ .