

University of Bahrain  
Department of Mathematics  
MATHS101: Calculus I  
Dr. Abdulla Eid



## Worksheet: Logarithmic Differentiation

Students' Name: \_\_\_\_\_

1. Find the inverse function of

1.  $f(x) = 3x + 2$ .

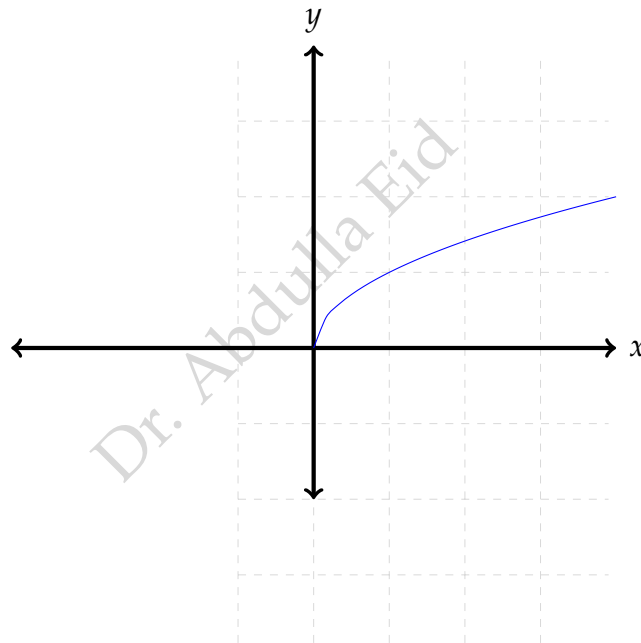
2.  $f(x) = x^2 - 1 (x > 0)$ .

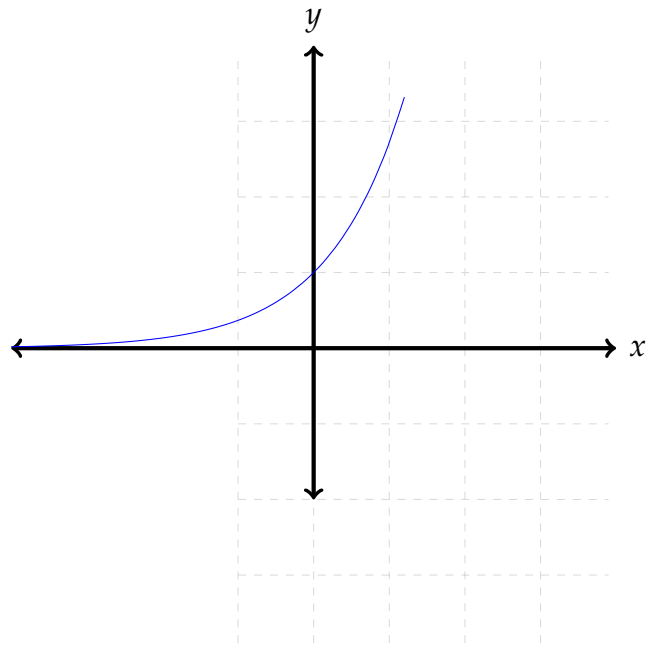
3.  $f(x) = \frac{1}{x}$ .

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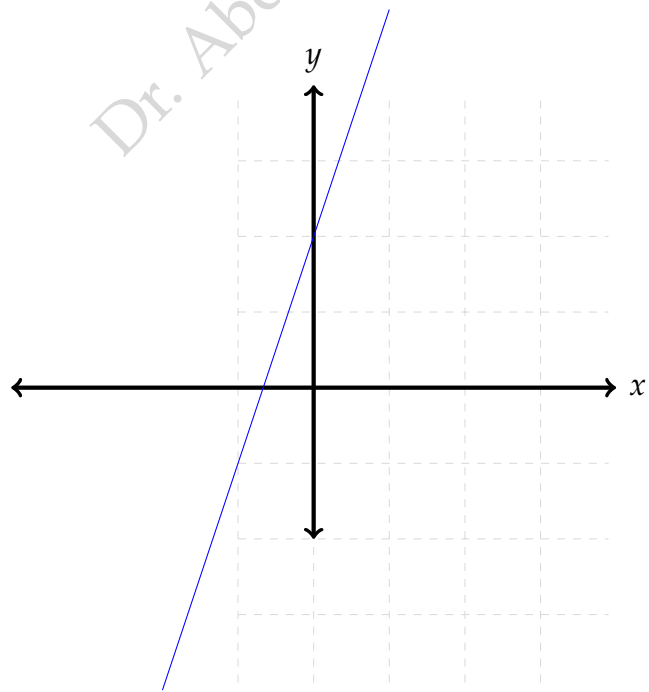
4.  $f(x) = \sqrt{x}$ .

2. Find the graph of the inverse function of the following functions:





2.



3.

3. Write each of the following expression as sum or difference of logarithms:

1.  $\log_3\left(\frac{5 \cdot 7}{4}\right)$

2.  $\log_2\left(\frac{x^5}{y^2}\right)$

3.  $\log\left(\frac{x^2 z}{w y^2}\right)$

4.  $\ln \sqrt{\frac{x+1}{x-2}}$

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4. Let  $f(x) = x + e^x$ . What is the value of  $f^{-1}(1)$ . Find  $(f^{-1})'(1)$ .

5. Find  $y'$  if  $y = \log_a x$ .  
(Hint: Use the change of base formula to change it to  $\ln$ )

6. Find the derivative of the following functions:

1.  $y = \ln(\csc x - \cot x)$

2.  $y = \frac{\ln x}{1 + \ln x}$

3.  $y = \ln \ln \ln x$

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7. Use logarithmic differentiation to find the derivative of the following functions:

1.  $y = (x)^{\sin x}$

2.  $y = (\ln x)^{\ln x}$

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$$3. y = \frac{(1 - 2x)^3(4 + 5x^6)^7}{\sqrt[3]{8 - 9x}}$$

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