Derivatives of the Natural Log Function
Calculus Section 3.2

Warm-up: Find $\frac{dy}{dx}$.

1. $y = (5x^2 - 4x)(3x^2 + 2x)$

2. $y = (5x^2 - 4x) + (3x^2 + 2x)$

Derivative of the Natural Log Function

Fill in the table and look for a relationship between x and $\frac{d}{dx}[\ln x]$.

$\frac{d}{dx}[\ln x]$ = _____

x	$\frac{d}{dx}[\ln x]$
$\frac{1}{5}$	
$\frac{1}{3}$	
$\frac{1}{2}$	
1	

Examples

1. $y = \ln(4x)$

2. $y = \ln(x^2 - 3)$

3. $y = \ln(3x^2 - 5x + 8)$

4. $y = \ln\sqrt{x}$

5. $y = x^2 \ln x$

6. $y = \frac{\ln x}{x}$

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7. $y = (\ln x)^5$

8. $y = \cos(\ln x)$

9. $y = \ln(\cos x)$

10. $y = \ln(\ln x)$

Use the properties of logs to take derivatives of difficult expressions.

Class Work

11. $y = \ln\sqrt{x^2 + 2x - 3}$

12. $y = \ln\left(\dfrac{x^2}{3x - 2}\right)$

13. $y = \ln(x\sqrt{3x - 1})$

14. $y = \ln\sqrt{\dfrac{x^2 + 1}{x^2 - 1}}$

15. $y = \ln\left(\dfrac{x(x^2 + 3)^3}{\sqrt[3]{2x^2 + 4}}\right)$

16. $x^2 - 3\ln y + y^2 = 25$

17. Find the equation of the tangent line to $y = 4x^2 - \ln x$ at (1, 4)