Exercise 22. Differentiating Logarithmic Functions

Differentiate the following using the laws for logarithms.

1. $\ln(4x - 10)$

2. $\ln(\cos 3x)$

3. $\ln(3x^3 + x)$

4. $\ln(5x^2 + 10x - 7)$

5. $\ln 8x$

6. $\ln(x^2 - 1)$

7. $3\ln 4x$

8. $2\ln(\sin x)$

Exercise 23. Differentiating logarithmic functions

In Problems 1 to 6, use logarithmic differentiation to differentiate the given functions with respect to the variable.

1. $y=\dfrac{(x-2)(x+1)}{(x-1)(x+3)}$

2. $y=\dfrac{(x+1)(2x+1)^3}{(x-3)^2(x+2)^4}$

3. $y=\dfrac{(2x-1)\sqrt{(x+2)}}{(x-3)\sqrt{(x+1)^3}}$

4. $y=\dfrac{e^{2x}\cos 3x}{\sqrt{(x-4)}}$

5. $y=3\theta\sin\theta\cos\theta$

Exercise 24. differentiating [f(x)]x type functions

In Problems 1 to 4, differentiate with respect to x

1. $y = x^{2x}$

2. $y = (2x-1)^{x}$

3. $y = \sqrt[x]{(x+3)}$

4. $y = 3x^{4x+1}$

5. Show that when $y = 2x^{x}$ and $x = 1$, $\dfrac{dy}{dx} = 2$.

6. Evaluate $\dfrac{d}{dx}\left\{\sqrt[x]{(x-2)}\right\}$ when $x = 3$.