**Name**_____

**Differentiate the following functions.**

1. $f(x) = 2^{\sin x}$
2. $g(t) = \ln \tan(\cos t)$
3. $y = 4e^{x^2+\sin x}$
4. $y = \dfrac{e^x + e^{-x}}{2}$
5. $f(x) = \log_3\left(x^4 + \sin 3x\right)$
6. $y = \frac{1}{x} + \ln x^3$
7. $y = 2\ln\sin x - 5\left(\ln x\right)^4$
8. $f(x) = \sin\ln x$
9. $f(x) = \log\left(10x - 3\right) + 3e^{\tan x}$
10. $y = \dfrac{e^x - e^{-x}}{e^x + e^{-x}}$

LOG / EXPONENTIAL DERIVATIVES

$$\frac{d}{dx}\left(a^x\right) = a^x \ln a$$

$$\frac{d}{dx}\left(\log_a x\right) = \frac{1}{x \ln a}$$

$$\frac{d}{dx}\left(e^x\right) = e^x$$

$$\frac{d}{dx}\left(\ln x\right) = \frac{1}{x}$$

# Answer Key to Worksheet: Log and Exponential Derivatives

1. $2^{\sin[x]}\cos[x]\ln[2]$

2. $-\csc[\cos[t]]\sec[\cos[t]]\sin[t]$

3. $4e^{x^2+\sin[x]}(2x+\cos[x])$

4. $\frac{1}{2}\left(-e^{-x}+e^{x}\right)$

5. $\frac{4x^3+3\cos[3x]}{\ln[3]\left(x^4+\sin[3x]\right)}$

6. $\frac{-1+3x}{x^2}$

7. $2\cot[x]-\frac{20(\ln[x])^3}{x}$

8. $\frac{\cos[\ln[x]]}{x}$

9. $\frac{10}{(-3+10x)\ln[10]}+3e^{\tan[x]}\sec[x]^2$

10. $\frac{4e^{2x}}{\left(1+e^{2x}\right)^2}$

Please report any mistakes you find.

Thank you.