

Name: _____

Exponential and Logarithmic Differentiation

Exercise 1: Differentiate the following functions:

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

2) $y = 2^{\sec x}$

3) $y = \pi^x$

4) $y = x^2 3^x$

5) $y = 10^{\sqrt{x}}$

6) $h(x) = e^{2x^2}$

7) $k(x) = x^2 e^x$

8) $g(x) = e^{x^3 - 2x - 3}$

9) $h(x) = \ln(1 - xe^{-x})$

10) $f(x) = \ln(x^4 \sin^2 x)$

11) $h(x) = \frac{\ln x}{x^3}$

12) $h(x) = \frac{e^x}{e^x - 1}$

13) $h(x) = e^{\ln(\sin x)}$

14) $f(x) = \frac{e^x - e^{-x}}{e^{2x}}$

15) $h(x) = \sqrt{e^x + x + 1}$

16) $h(x) = \log(2 + \cos(x) + \sin(x))$

17) $f(x) = \ln|x^3 - 2x - 3|$

18) $h(x) = x^2 \ln x$

19) $f(x) = \ln(\ln x)$

20) $k(x) = e^{e^x}$

21) $f(x) = \ln(\cos x)$

22) $k(x) = e^{\tan x}$

23) $f(x) = \ln \left[\frac{\sqrt[3]{3x+1}}{\sqrt{x^2+1}} \right]$

24) $g(x) = e^{x/x+1}$

25) $h(x) = \sqrt{\ln x}$

26) $k(x) = \sqrt{e^x}$

27) $h(x) = \ln(\sec(e^x))$

Exercise 2: Use **Logarithmic Differentiation** only to find $f'(x)$:

1) $g(x) = x^{5x}$

2) $h(x) = x^{4x}$

3) $f(x) = (\sin x)^x$

4) $f(x) = (\cos x)^x$

5) $f(x) = (x)^{\sin x}$

6) $f(x) = (x)^{\cos x}$

7) $g(x) = x^{\ln 2x}$

8) $g(x) = x^{\ln x}$

9) $f(x) = \frac{(x^2 - 2)^7 (x + 2)^{13}}{(2x - 3)^8}$

10) $f(x) = \frac{(3x^2 + 1)^{12} (2x - 3)^{10}}{(1 - 6x)^8}$