

Quiz 5, MATH 1300-401

Name: \_\_\_\_\_

Differentiate the following functions. Do not simplify your results. (One point each, maximum ten points.)

1.  $x^3, x^{-3/4}, \frac{1}{x^2}, \frac{1}{\sqrt[3]{x}}$

$$3x^2, \frac{-3}{4}x^{-7/4}, -2x^{-3}, \frac{-1}{3}x^{-4/3}$$

2.  $e^x, 2^x, \ln x, \log_2 x$

$$e^x, 2^x \ln 2, \frac{1}{x}, \frac{1}{x \ln 2}$$

3.  $\sin x, \cos x, \tan x$

$$\cos x, -\sin x, \sec^2 x$$

4.  $\csc x, \sec x, \cot x$

$$-\csc x \cot x, \sec x \tan x, -\csc^2 x$$

5.  $\arcsin x, \arccos x, \arctan x$

$$\frac{1}{\sqrt{1-x^2}}, \frac{-1}{\sqrt{1-x^2}}, \frac{1}{1+x^2}$$

6.  $x^2 2^x$

$$x^2 2^x \ln 2 + 2x 2^x$$

7.  $x^x$

$$y = x^x, \ln y = x \ln x, \frac{y'}{y} = 1 + \ln x, y' = x^x(1 + \ln x)$$

8.  $\frac{e^{-1/x}}{x^2 - 1}$

$$\frac{(x^2 - 1)e^{-1/x}(1/x^2) - e^{-1/x}(2x)}{(x^2 - 1)^2}$$

9.  $x \ln x - x$

$$\ln x$$

10.  $\ln(\arcsin x)$

$$\frac{1}{\arcsin x} \frac{1}{\sqrt{1-x^2}}$$

11.  $3^{\cot x}$

$$3^{\cot x} \ln 3 (-\csc^2 x)$$

12.  $e^{\cos x} + \cos(e^x)$

$$e^{\cos x} (-\sin x) - e^x \sin(e^x)$$

$$13. (4x^2 - 3x + 2)^{25} \quad (4x^2 - 3x + 2)^{24}(8x - 3)$$

$$14. \ln \left( \sin \left( \frac{2x-1}{3x-4} \right) \right) \\ \frac{1}{\sin \left( \frac{2x-1}{3x-4} \right)} \cos \left( \frac{2x-1}{3x-4} \right) \frac{(3x-4)2 - (2x-1)3}{(3x-4)^2}$$

$$15. \frac{\log_3(x)}{e^x + x^e} \\ \frac{(e^x + x^e) \frac{1}{x \ln 3} - \log_3 x (e^x + ex^{e-1})}{(e^x + x^e)^2}$$

$$16. e^{-kx} \cos(ax + b) \quad (a, b, k \text{ constant with respect to } x) \\ -ke^{-kx} \cos(ax + b) - ae^{-kx} \sin(ax + b)$$

$$17. \sec \left( \frac{1}{1+x^2} \right) \\ \sec \left( \frac{1}{1+x^2} \right) \tan \left( \frac{1}{1+x^2} \right) \frac{-2x}{(1+x^2)^2}$$

$$18. \arctan \left( \sqrt{x + \sqrt{x}} \right) \\ \frac{1}{1+x\sqrt{x}} \frac{1}{2\sqrt{x+\sqrt{x}}} \left( 1 + \frac{1}{2\sqrt{x}} \right)$$

$$19. x^2 e^{-x} \ln x \\ 2xe^{-x} \ln x - x^2 e^{-x} \ln x + x^2 e^{-x} \frac{1}{x}$$

$$20. e^\pi + 2^{x^3} \\ 0 + 2^{x^3} (\ln 2)(3x^2)$$