

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 5

MATHEMATICS 1000

FALL 2022

Due: Wednesday, November 2nd, 2022 at 11:59pm. Show all work. See the Grade-scope Handout for submission information.

Note: You should complete the WebAssign problem sets “Derivatives of Algebraic Functions,” “Algebraic Products and Quotients,” “Derivatives of Trigonometric Functions” and “Trigonometric Products and Quotients”, as well as Worksheets 2.3, 2.4 and 3.1, before you work on this assignment. Beginning with this assignment, you may use the rules of differentiation rather than the limit definition of the derivative, unless otherwise noted.

1. Differentiate each of the following functions.

(a) $y = \frac{\sqrt{x} + 4}{\sqrt{x} - 4}$

(b) $y = \frac{x^2 e^x}{5x + 1}$

(c) $f(t) = t^{\frac{4}{3}} e^t \cot(t)$

2. Find the equations of the tangent and normal lines to the curve $y = \sin(x) \tan(x)$ at $x = \frac{\pi}{6}$.

3. Use the limit definition of the derivative to prove that $\frac{d}{dx}[\cos(x)] = -\sin(x)$.