

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 6

MATHEMATICS 1000

FALL 2022

Due: Wednesday, November 9th, 2022 at 11:59pm. Show all work. See the Grade-scope Handout for submission information.

Note: You should complete the WebAssign problem sets “The Chain Rule”, “Derivatives of Exponential Functions”, “Implicit Differentiation” and “Derivatives of Logarithmic Functions”, as well as Worksheets 3.2, 3.3 and 3.4, before you work on this assignment.

1. Differentiate each of the following functions.

(a) $f(t) = \sin(t^3 e^t)$

(b) $y = [\sin(x)]^{\cos(x)}$

(c) $f(x) = \ln\left(\frac{x \tan^7(3x)}{\sqrt[3]{x^2 + 1}}\right)$

2. The curve defined by the equation

$$x^4 + 8y^3 = 8x^2y$$

is known as a *bow curve*. (Its graph is shown in Figure 1 on the next page.) Find the equation of the tangent line at the point $(3, \frac{3}{2})$.

3. Use logarithmic differentiation to find the derivative of

$$y = \frac{(2x + 7)^3 e^x}{x^9 \sin^2(x)}.$$

PLEASE TURN OVER

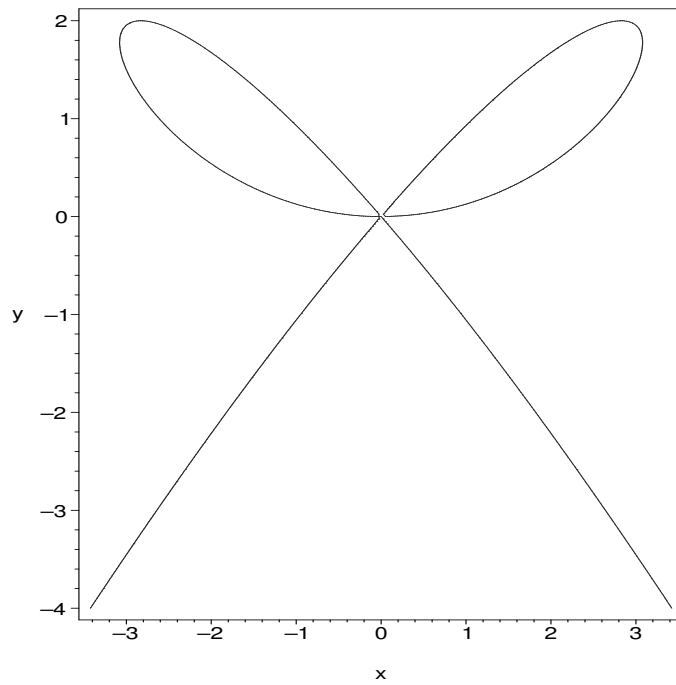


Figure 1: The graph of the equation $x^4 + 8y^3 = 8x^2y$.