

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

SECTION 2.2

Math 1000 Worksheet

FALL 2023

For practice only. Not to be submitted.

1. Use the definition of the derivative to differentiate the functions in each case.

(a) $f(x) = \frac{3x}{x-4}$

(b) $f(t) = \frac{4}{t^2+1}$

(c) $f(x) = \sqrt{2-3x}$

(d) $g(x) = \sqrt{x^2+1}$

2. Use the definition of the derivative to find the equation of the tangent line to the curve $f(x) = x^3 - 3x^2 + 2x$ at the point $x = 3$. Show that this line is parallel to the tangent line at $x = -1$.
3. Given that $f(x) = |3x+6|$ is continuous at $x = -2$, determine whether it is also differentiable there.
4. Given that

$$f(x) = \begin{cases} x^3 + 3x^2 - 15, & \text{for } x \geq -4 \\ 17 - 3x^2, & \text{for } x < -4 \end{cases}$$

is continuous at $x = -4$, determine whether it is also differentiable there.