

# MEMORIAL UNIVERSITY OF NEWFOUNDLAND

## DEPARTMENT OF MATHEMATICS AND STATISTICS

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SECTION 2.2

Math 1000 Worksheet

FALL 2022

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**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.