SECTION 2.2 **Math 1000 Worksheet** FALL 2024

For practice only. Not to be submitted.

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

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

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

   (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.