MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

SECTION 3.1 **Math 1000 Worksheet** FALL 2025

For practice only. Not to be submitted.

1. Differentiate each of the following.

   (a) $f(x) = e^{x+2}$

   (b) $g(x) = 5\sin(x) - \dfrac{1}{2}\sqrt{x}$

   (c) $f(t) = t^{\frac{7}{3}} - \cos(t) + \pi^2$

   (d) $y = 2x^4 \tan(x)$

   (e) $g(\theta) = \sin(\theta)\tan(\theta)$

   (f) $f(t) = \dfrac{\csc(t)}{t}$

   (g) $f(x) = \dfrac{1 - \sec(x)}{1 + \sec(x)}$

   (h) $y = x^3 e^x \cot(x)$

   (i) $f(x) = \dfrac{xe^x}{\sqrt{x} - 3}$

2. Find the equations of the tangent and normal lines to the graph of

   $$f(x) = 2\tan(x) - \sqrt{2}\sin(x)$$

   at the point $\left(\dfrac{\pi}{4}, 1\right)$.

3. Prove that $\dfrac{d}{dx}[\csc(x)] = -\csc(x)\cot(x)$.

4. Prove that $\dfrac{d}{dx}[\tan(x)] = \sec^2(x)$.