CALCULATING DERIVATIVES

Instructions. Put the first and last name of everyone in your workgroup at the top of your paper. Everyone is to do their own worksheet but only one from each group is graded with the score shared. Be sure to show your work and explain your reasoning.

1. Use the definition to determine the derivative of the given function at a general point $a$.

   (a) $f(x) = \frac{2x + 1}{3x + 4}$

   (b) $f(x) = \sqrt{x^2 + 1}$

2. Using the derivative rules (and not the limit definition of derivative), find the derivatives of the following functions. Do not use the chain rule in the worksheet.

   (a) $q(x) = \left(\frac{x\sqrt{x}}{\sqrt[3]{x}}\right)^{12} + \ln\left(\frac{\pi^3}{e^2 + 4}\right)$

   (b) $w(t) = \frac{5}{\sqrt{t} + 5e^t}$
3. What is the slope of \( y = 5e^x - 25\tan(x) + 50\sin(x) + 10x^2 - 100 \) at its y-intercept?

4. Which graph might best represent the following physical scenarios?

(a) The position of a car at a stop sign.
(b) The position of a car coming to a stop.
(c) The velocity of a car coming to a stop.
(d) The position of a car leaving a stop sign.
(e) The velocity of a car leaving a stop sign.
(f) The position of a car traveling on the expressway.
(g) The velocity of a car traveling on the expressway.