Math 113: Quiz 4

Instructions: Answer all questions. Show all of your work. Partial credit may be given. The use of calculators is not allowed. Please turn off and put away all mobile electronic devices - accessing these devices between the time you receive your quiz and the time you turn in your quiz constitutes an honor code violation.

1. (2 pts) Sketch in the graph on the right the derivative \( f'(x) \) of the function \( f(x) \) shown on the left.

2. (6 pts) Find the derivative of the following functions using any method of your choosing.

   \[ f(x) = x^{1/3} + 1 \quad \Rightarrow \quad f'(x) = \frac{1}{3} x^{-2/3} + 0 \]

   \[ f(x) = \frac{3x - 2}{4x + 1} \quad \Rightarrow \quad f'(x) = \frac{(4x+1)(3) - (3x-2)(4)}{(4x+1)^2} = \frac{12x + 3 - 12x + 8}{(4x+1)^2} = \frac{11}{(4x+1)^2} \]

   \[ f(x) = x^{10} + 10^x \quad \Rightarrow \quad f'(x) = 10x^9 + ln(10) \cdot 10^x \]

3. (2 pts) Find the equation of the line tangent to the function

   \[ f(x) = x^3 + 4x^2 - x + 1 \]

   at the point on the graph of \( f(x) \) where \( x = 1 \). Note: you do not need to compute the derivative of this function using the limit definition.

   \[ y - f(1) = f'(1)(x-1) \]

   \[ y - 5 = 10(x-1) \]  

   \[ f'(1) = 3(1)^2 + 8(1) - 1 = 10 \]

   \[ f(1) = 1 + 4 - 1 - 1 = 5 \]

   \[ f'(1) = 3 + 8 - 1 = 10 \]