Problems in Finding Derivatives and Tangent Lines

1. Use the definition of the derivative to compute $f'(1)$ for $f(x) = \dfrac{13}{x+7}$. NO CREDIT will be given for any other method.

2. Compute the derivatives of the following functions. DO NOT SIMPLIFY.

(a) $f(x) = (sinx + x^2 + 1)(2x^3 + x)^2$

(b) $g(x) = \dfrac{x^2 + 12x + e^3}{x + e^x}$

(c) $h(t) = e^{3t}(t^2 + x^2)$

3. Find $h'(1)$ where $h(x) = \dfrac{xg(x) + 7}{f(x)}$, $f'(1) = 4$, $g'(1) = -2$, and $f(1) = 1$, $g(1) = 1$. EXPREE YOUR ANSWER AS AN INTEGER.

4. Find the equation of the tangent line to $y = f(x) = \dfrac{x+3}{2x+1}$ at the point corresponding to $x = 0$.

5. Find the y-intercept of the tangent line to the curve $y = x^3 + 1$ at the point $(2, 9)$.

6. Find the x and y coordinates of the point on the graph of $y = \dfrac{1}{4}(2x + 1)^2$ where the tangent line is parallel to the line $y - 3x = 1$.