1. Let $y = 3cx^4 - 4c^2x - 8c$

(a). Find $\dfrac{dy}{dx}$. [Assume c is constant]

(b). Find $\left.\dfrac{dy}{dx}\right|_{x=2}$

2. Differentiate the following **without** using the Product or Quotient Rule. Use the headings as guides.

Function	*Rewrite/Simplify*	*Differentiate*	*Simplify*

(a). $y = \dfrac{x^2 + 2x}{x}$

(b). $y = \dfrac{7}{3x^3}$

(c). $y = \dfrac{x\sqrt{x} + 4}{2\sqrt{x}}$

3. Differentiate the following and simplify your final answers. [You must decide whether to simplify or not before differentiating.]

(a). $y = \dfrac{1}{3}(2x^3 - 4)$

(b). $y = \dfrac{5x + \sqrt{x}}{2x - 1}$

(c). $g(x) = \dfrac{3x + 1}{3x}$

(d). $g(x) = \dfrac{3x}{3x + 1}$

(e). $f(x) = (x^5 + 4)^2$

(f). $s(t) = \left(\dfrac{t^3 + 2t^2 - t + 7}{5t^4 - 3t + 1}\right)\left(\dfrac{6t^8 + 7t^5 - 3t^3 + 2t - 1}{9t^2 - 3}\right)$ Do not simplify part (f)

4. For $g(x) = \dfrac{3x}{3x+1}$ [Note: This is the same function as #3(d), so you already have $g'(x)$.]

(a). Find an equation of the tangent line to $g(x) = \dfrac{3x}{3x+1}$ at $x = -2$.

(b). Find the 2nd derivative of $g(x) = \dfrac{3x}{3x+1}$.

5. Find the first and second derivatives of $y = \sqrt[3]{x^2}$

6. Given $f(x) = \frac{1}{3}x^3 + x^2 + x - 1$

(a). Find the ***points*** on the graph where the

(*i*) slope is 0

(*ii*) slope is 1

(*iii*) slope is 4

(b). Use your calculator to draw the function $f(x)$. Sketch it below and plot the points found in part (a). Sketch the tangent lines at those points – do they seem like they have the given slopes? [You do not need to find the equations for the tangent lines]