Show all work.

1. **(6 points)** *Using the difference quotient definition of the derivative*, find the derivative of the function $f(x) = 3 + 6x - 2x^2$.

2. **(4 points)** Determine the equation of the tangent line to the graph $y = x^3 - 4x + 4$ at the point $(-2, 4)$.

3. **(10 points)** Answer the following questions about derivatives:

   (a) **(3 points)** If $y = 4x^2 - 3x + 2\sqrt{x} - \frac{5}{x^4}$, what is $\frac{dy}{dx}$?.

   (b) **(3 points)** If $f(s) = 5e^s + \frac{2}{s}$, what is $f''(s)$?

   (c) **(4 points)** Calculate $\frac{d}{dt}\frac{7t^4 - \sqrt[3]{t} + 1}{t^2}$.