Math Camp Exercises - Day 3

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1. Use the definition of derivative (with limits) to find the derivative of y with respect to x for the following:
   (a) $y = 10$
   (b) $y = x^2 + 2x - 1$
   (c) $y = 2x^3 + 5x^2 - 6$
   (d) $y = 2x^4 - 3x^2$
   (e) $y = -5x^4 + 3x^2 + x - 10000$

2. Differentiate the following (it is not necessary to simplify everything!):
   (a) $f(x) = x^{-3}$
   (b) $f(x) = ax^4 + 10c$, where a and c are constants.
   (c) $f(x) = x^{\frac{2}{3}}$
   (d) $f(x) = (x - x^2)(2x^3 + 5x^2 - 7)$
   (e) $f(x) = (x + 1)^5$
   (f) $f(x) = \frac{-2x^2 + x^3}{x^2 - x}$
   (g) $f(x) = 3e^{5x^5 - x^2}$
   (h) $f(x) = x^2 e^x ln(x) + 3x^5$
   (i) $f(x) = c^{x^3 - 1}$

3. Find the extrema of the following equation:
   $f(x) = \frac{1}{3}x^3 - \frac{5}{2}x^2 + 4x, x \in [-1, 6]$