DUE: Tuesday, July 23$^{\text{rd}}$ Please turn in a paper copy and **SHOW YOUR WORK!**

1. Use the limit definition of the derivative to find $f'(x)$ if...
   [You use should the rules we learned to double check your answer.]

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

   (b) $f(x) = \dfrac{1}{x^2 - 2}$

2. Find the equation of the line tangent to the graph of $y = f(x)$ at $x = x_0$ if...

   (a) $f(x) = x^3 + x^2 + 1$ and $x_0 = -2$

   (b) $f(x) = \dfrac{1}{x^2 - 2}$ and $x_0 = 1$

3. Compute the derivative of each of the following functions. **Please simplify your answers.**

(a) $y = \sqrt[3]{x} - 12e^x + 4\ln(x) + \frac{1}{x^7} + 9x - 2$

(b) $y = (x^7 + 3)\ln(5x + 1)$

(c) $y = \dfrac{x\ln(x) + 1}{x^2 + 3x + 6}$

(d) $y = \left(1 + 3e^{x^2}\right)^{11}$

(e) $y = \ln\left(\dfrac{7(x^3 + 1)^5}{e^{-2x}\sqrt{x - 2}}\right)$