1. (10 pts; p 137 #18) For the function \( f(x) = x^3 \), find \( f'(x) \) using the definition on page 128 of the text (show your work). Then find an equation of the tangent line to the graph at the point \((-2, -8)\), at the point \((0, 0)\), and at the point \((4, 64)\).

\[
f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \to 0} \frac{(x+h)^3 - x^3}{h} = \lim_{h \to 0} \frac{x^3 + 3x^2h + 3xh^2 + h^3 - x^3}{h} = \lim_{h \to 0} \frac{3x^2h + 3xh^2 + h^3}{h} = 3x^2 + 3x(0) + (0)^2 = 3x^2
\]

Remember that the derivative (at a point) gives you the slope of the tangent line (at that point).

\[
f'(-2) = 3(-2)^2 = 12 \text{ so the tangent line at } (-2, -8) \text{ is } y = 12(x + 2) - 8
\]

\[
f'(0) = 3(0)^2 = 0 \text{ so the tangent line at } (0, 0) \text{ is } y = 0
\]

\[
f'(4) = 3(4)^2 = 48 \text{ so the tangent line at } (4, 64) \text{ is } y = 48(x - 4) + 64
\]

2. (10 pts; p 137 #20) For the function \( f(x) = \frac{2}{x} \), find \( f'(x) \) using the definition (show your work). Then find an equation of the tangent line to the graph at the point \((-1, -2)\), at the point \((2, 1)\), and at the point \((10, .2)\).

\[
f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \to 0} \frac{1}{h} \left( \frac{2}{x+h} - \frac{2}{x} \right) = \lim_{h \to 0} \frac{1}{h} \left( \frac{2(x) - (x+h)(2)}{(x+h)(x)} \right)
\]

\[
f'(-1) = \frac{-2}{(-1)^2} = -2 = -2 \text{ so the tangent line at } (-1, -2) \text{ is } y = -2(x + 1) - 2
\]

\[
f'(2) = \frac{-2}{2^2} = -\frac{1}{2} \text{ so the tangent line at } (2, 1) \text{ is } y = -\frac{1}{2}(x - 2) + 1
\]

\[
f'(10) = \frac{-2}{10^2} = -\frac{2}{100} = -0.02 \text{ so the tangent line at } (10, .2) \text{ is } y = -0.02(x - 10) + .2
\]