1.) Assume that the function \( w(t) \) is your weight (in pounds) at time \( t \) (in months).

   a.) What are the units for the derivative \( w'(t) \)?
   b.) What is the meaning of \( w'(t) \) in this context?

2.) For each function \( y = f(x) \) solve \( f'(x) = 0 \) for \( x \) and set up a sign chart for \( f' \).

   a.) \( f(x) = \frac{x^3}{x - 2} \)
   b.) \( f(x) = (1/2)x - \cos x \) for \( 0 \leq x \leq 2\pi \).

3.) Use the graph of \( f \) to sketch the graphs of \( f' \) and \( f'' = (f')' \), the derivative of the derivative.

   ![Graph of f, f', and f'']

4.) Use the graph of \( f' \) to sketch the graph of \( f \).

   ![Graph of f and f']

5.) Use \( \lim_{h \to 0} \frac{f(x + h) - f(x)}{h} \) to differentiate the function \( f(x) = \ln x \) \hspace{1cm} (HINT: Use properties of logarithms and the fact that \( \lim_{w \to 0} \left(1 + w\right)^{1/w} = e \).)