(1) Let $f$ and $g$ be functions, and let $h$ be the function defined by $h(x) = f(x)g(x)$. Find the average rate of change $\frac{\Delta h}{\Delta x}(x_0, \Delta x)$. Does it equal the product of the average rates of change $\frac{\Delta f}{\Delta x}(x_0, \Delta x)$ and $\frac{\Delta g}{\Delta x}(x_0, \Delta x)$?

(2) Let $f(x) = \frac{1}{x}$.

(a) Compute $\frac{\Delta f}{\Delta x}(x_0, \Delta x)$.

(b) Find an approximation for $\frac{\Delta f}{\Delta x}(x_0, \Delta x)$ when $\Delta x$ is small.

(c) Without using a calculator, use your result from part (b) to approximate $1/17$. Please express your answer as a decimal.

(d) How close is your approximation from part (c) to the actual value? Use a calculator to find the percent error.

(3) Let $g(x) = x^{1/3}$.

(a) Compute $\frac{\Delta g}{\Delta x}(x_0, \Delta x)$.

(b) Find an approximation for $\frac{\Delta g}{\Delta x}(x_0, \Delta x)$ when $\Delta x$ is small. **Hint:** To rewrite the average rate of change in a way that allows you to understand its behavior for small change, you can multiply by 1 in a fancy way (like we did with the conjugate in our square root example from class). Try multiplying both the numerator and denominator by $(a^2 + ab + b^2)$, with $a = (x + \Delta x)^{1/3}$ and $b = x^{1/3}$. Then use the identity $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$.

(c) Without using a calculator, use your result from part (b) to approximate $\sqrt[3]{8.0156}$.

(d) How close is your approximation from part (c) to the actual value? Use a calculator to find the percent error.