Assignment 6

Problem 1

Find the average rate of change of the function $f(t) = 16t^2$ over the intervals $[1, 1.5]$ and $[1, 1.1]$. How can we express the average rate of change over $[1, 1.1]$ in the form $\frac{f(1+h)-f(1)}{h}$ where $f(x) = 16x^2$?

Problem 2

Calculate the instantaneous rate of change of the function $f(x) = 16x^2$ at the point $x = 1$ using the definition.

Problem 3

Find the derivative of the function $f(x) = \sqrt{x}$ for $x > 0$. Determine the line tangent to the curve $y = \sqrt{x}$ at the point $x = 3$.

Remember the equation for a line is given by $y - y_1 = m(x - x_1)$, where m is the slope at the point (x_1, y_1).

Problem 4

Show that the derivative of $f(x) = \sqrt{x}$ does not exist at $x = 0$.

Hint: determine $\displaystyle\lim_{h \to 0^+} \frac{\sqrt{x + h} - \sqrt{x}}{h}$ when $x = 0$.