MATH 5105 Differential and Integral Analysis
Assignment 1

1. Using the definition of continuity, show that the following function is continuous

$$q(z) = \frac{1}{z^3} \text{ at } z_0 \in (0, \infty).$$

2. Suppose that $g : I \to \mathbb{R}$ is differentiable at $x = x_0$. Does the following limit

$$\lim_{h \to 0} \frac{g(x_0 + 6h) - g(x_0 - 6h)}{12h}.$$

exist? (Either prove your answer or give a counterexample).

Is the converse true? That is suppose the limit

$$\lim_{h \to 0} \frac{g(x_0 + 6h) - g(x_0 - 6h)}{12h} = L$$

exists, is g differentiable at $x = x_0$? (Either prove your answer or give a counterexample).

(**4 marks**)