

1996 Paper 2 Question 4

Let $f(x) = \begin{cases} x^3 \sin \frac{1}{x} & \text{for } x \neq 0 \\ 0 & \text{for } x = 0 \end{cases}$

- a. Evaluate $f'(x)$ for $x \neq 0$.
 - b. Prove that $f'(0)$ exists.
 - c. Is $f'(x)$ continuous at $x = 0$? Explain.
- (6 marks)