1. Let \( f(x) = \frac{|x|x^3}{x^3 - 2} \) for \( x \neq \sqrt{2} \).

   (a) i. Find \( f'(x) \) and \( f''(x) \).
       ii. Prove that \( f'(0) \) exists.
       iii. Does \( f''(0) \) exist? Explain your answer.

   (b) Find the range of \( x \) for which \( x \) satisfies the following :
       i. \( f'(x) > 0 \).
       ii. \( f''(x) > 0 \).

   (c) Find the local extreme points and inflexional points of \( f(x) \).

   (d) Find the asymptotes to the graph of \( f(x) \).

   (e) Sketch the graph of \( f(x) \).