1. Let \( f(x) = x^{\frac{3}{2}}(x + 1)^{\frac{1}{2}} \).
   (a) i. Find \( f'(x) \) for \( x \neq -1, 0 \).
       ii. Show that \( f''(x) = \frac{-2}{9x^{\frac{7}{2}}(x + 1)^{\frac{5}{2}}} \). [2]
   (b) Determine with reasons whether \( f'(-1) \) and \( f'(0) \) exist or not. [2]
   (c) Determine the values of \( x \) for each of the following cases:
       i. \( f'(x) > 0 \).
       ii. \( f'(x) < 0 \).
       iii. \( f''(x) > 0 \).
       iv. \( f''(x) < 0 \). [3]
   (d) Find all relative extrema and points of inflexion of \( f(x) \). [3]
   (e) Find all asymptotes to the graph of \( f(x) \). [2]
   (f) Sketch the graph of \( f(x) \). [3]