1. Let \( f(x) = x^{3/2}(x + 1)^{1/3} \).
   
   (a) i. Find \( f'(x) \) for \( x \neq -1, 0 \).
   
   ii. Show that \( f''(x) = \frac{-2}{9x^{4/3}(x + 1)^{2/3}} \).

   (b) Determine with reasons whether \( f'(-1) \) and \( f'(0) \) exist or not.

   (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. \( f''(x) < 0 \).

   (d) Find all relative extrema and points of inflexion of \( f(x) \).

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

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

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

   (a) i. Find \( f'(x) \) and \( f''(x) \) for \( x \neq -1, -2 \).
   
   ii. Is \( f \) differentiable at \( x = -2 \) ? Explain your answer.

   (b) Determine the values of \( x \) for each of the following cases:
      
      i. \( f'(x) > 0 \).
      
      ii. \( f'(x) < 0 \).
      
      iii. \( f''(x) > 0 \).
      
      iv. \( f''(x) < 0 \).

   (c) Find all relative extrema and points of inflexion of \( f(x) \).

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

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