1991 Paper II Question 10 modified

Let $f(x) = \sqrt[3]{x^3 - x^2 - x + 1}$.

a. Find the roots of $f(x) = 0$.

b. Find $f'(x)$ for $x \neq 1$ and $x \neq -1$. Prove that $f'(1)$ and $f'(-1)$ do not exist.

c. Determine the sets of values of x such that:

(i) $f'(x) = 0$,

(ii) $f'(x) > 0$,

(iii) $f'(x) < 0$

d. Find $f''(x)$ for $x \neq \pm 1$. Hence, or otherwise, find all relative extrema and points of inflexion of $f(x)$.

e. Find the slant asymptote of the graph of $f(x)$.

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