Exercise 1 [5 points]

Let \( f(x) = \begin{cases} \frac{x^2 - 1}{x - 1} & ; \; x < 1 \\ \frac{ax^2 - bx}{ax - b} & ; \; 1 \leq x < 2 \\ \frac{a}{x} - b & ; \; x \geq 2 \end{cases} \)

Find the values of \( a \) and \( b \) that makes \( f \) continuous everywhere.

Exercise 2 [3 points]

Let \( f(x) = \frac{x-4}{\sqrt{9x^2+2x+1}} \). Find the horizontal asymptotes of \( f \).

Exercise 3 [2 points]

Below, each limit represents the derivative of some function \( f \) at some number \( a \). State such \( f \) and \( a \) in each case:

(a) \( \lim_{h \to 0} \frac{\sqrt[4]{81+h}-3}{h} \) Then, \( a = \quad f(x) = \)

(b) \( \lim_{t \to 1} \frac{t^4+2t-3}{t-1} \) Then, \( a = \quad f(x) = \)