

Worksheet 2.3, 2.5, 2.6

1. Using limit laws to evaluate the following limits

$$\lim_{x \rightarrow 2} \frac{\sqrt{x+2} - 2}{x - 2} \qquad \lim_{t \rightarrow 0} \left(\frac{1}{t} - \frac{1}{t^2 + t} \right) \qquad \lim_{x \rightarrow -3} \frac{3x^2 + 7x - 6}{2x^2 + 5x - 3}$$

2. Sketch the graph of a function f that is neither left nor right continuous at -2 and continuous only from the left at 2 .

3. Find the values of a and b that make f continuous everywhere.

$$f(x) = \begin{cases} \frac{x^2 - 4}{x - 2} & \text{if } x < 2 \\ ax^2 - bx + 3 & \text{if } 2 \leq x < 3 \\ 2x - a + b & \text{if } x \geq 3 \end{cases}$$

4. Use the Intermediate Value Theorem to show that there is a solution to the equation $\sqrt[3]{x} = 1 - x$ in the interval $[0, 1]$.

5. Compute the following limits.

(a) $\lim_{x \rightarrow \infty} \frac{3x^3 - 4x^2 + x}{x^3 - x + 1}$

(b) $\lim_{x \rightarrow 0^+} \tan^{-1}(\ln x)$

6. Find the horizontal and vertical asymptotes of the curve

$$f(x) = \frac{2e^x}{e^x - 5}$$