

## 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

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