

1. Consider the rational function

$$g(x) = \frac{2x^2 - 2}{x^2 - 3x + 2}.$$

(a) For what values of x is g discontinuous?

(b) Find the left/right limits (possibly $\pm\infty$) of g at each of the x -values from (a).

(c) What is $\lim_{x \rightarrow \infty} g(x)$?

2. Consider the following function (where $a, b \in \mathbb{R}$ are constants)

$$f(x) = \begin{cases} 3x - 2 & \text{if } x < -2 \\ ax^2 + bx + 1 & \text{if } -2 \leq x < 3 \\ ax + b & \text{if } x \geq 3 \end{cases}$$

(a) Determine $\lim_{x \rightarrow -2^-} f(x)$, $\lim_{x \rightarrow -2^+} f(x)$, $\lim_{x \rightarrow 3^-} f(x)$, and $\lim_{x \rightarrow 3^+} f(x)$.

(b) Find values of a and b that will make f continuous on $(-\infty, \infty)$. [Write down two equations in the two unknowns a and b , one to describe continuity at $x = -2$ and another to describe continuity at $x = 3$.]