

Problem 1: Consider the function $f(x) = 5 - \frac{2x}{x^2 - x}$.

(a) If it exists, find the limit. If it does not exist, show why. Use the symbols ∞ or $-\infty$ as appropriate.

(i) $\lim_{x \rightarrow 2} f(x)$

(ii) $\lim_{x \rightarrow 0} f(x)$

(iii) $\lim_{x \rightarrow \infty} f(x)$

(iv) $\lim_{x \rightarrow 1} f(x)$

(b) Find the values where $f(x)$ is discontinuous. State the type of discontinuity of each one.

Problem 2:

(1) Find all values of C which will make the following function continuous.

$$f(x) = \begin{cases} C - 2x & \text{if } x > 3, \\ x^2 - 2C & \text{if } x \leq 3. \end{cases}$$

(2) If $f(x) = \sqrt{x+1}$, find $\lim_{h \rightarrow 0} \frac{f(3+h) - f(3)}{h}$