

## Problem 1

Find the following infinite limits

1.  $\lim_{x \rightarrow 5^+} \frac{x+1}{x-5}$
2.  $\lim_{x \rightarrow \pi^-} \cot(x)$

## Problem 2

Given  $\lim_{x \rightarrow 2} f(x) = 4$ ,  $\lim_{x \rightarrow 2} g(x) = -2$ ,  $\lim_{x \rightarrow 2} h(x) = 0$   
Find the following limits if they exist. If not, explain why.

1.  $\lim_{x \rightarrow 2} f(x) + 5g(x)$
2.  $\lim_{x \rightarrow 2} \sqrt{f(x)}$
3.  $\lim_{x \rightarrow 2} \frac{g(x)}{h(x)}$

## Problem 3

Evaluate the following limits:

1.  $\lim_{t \rightarrow -2} \frac{t^4 - 2}{2t^2 - 3t + 2}$
2.  $\lim_{x \rightarrow 4} \frac{x^2 + 3x}{x^2 - x - 12}$

## Problem 4

Show that  $f(x)$  is continuous for all real numbers for the following:

1.  $f(x) = \begin{cases} 1 - x^2, & x \leq 1 \\ \log(x) & x > 1 \end{cases}$
2.  $f(x) = \begin{cases} \sin(x), & x < \frac{\pi}{4} \\ \cos(x) & x \geq \frac{\pi}{4} \end{cases}$

## Problem 5

Use the intermediate value theorem to show that the equation  $e^x = 3 - 2x$  has a solution in the interval  $(0, 1)$ .

## Problem 6

Find values for  $a, b$  such that the following function is continuous

$$f(x) = \begin{cases} \frac{x^2-4}{x-2}, & x < 2 \\ ax^2 - bx + 3, & 2 \leq x < 3 \\ 2x - a - b, & x \geq 3 \end{cases} \quad (1)$$