

Calculus Midterm

1 Limits

Find the following limits:

$$\lim_{x \rightarrow +\infty} \frac{5x^2 + 12x - 15}{-3x^2 - 7x + 28}$$

$$\lim_{x \rightarrow 4^-} \frac{x - 5}{(x - 6)(x - 4)}$$

$$\lim_{x \rightarrow x^-} \frac{|x - 2|}{x - 2}$$

$$\lim_{x \rightarrow 0} \frac{\sin 3x}{x}$$

2 Continuity

Find the value of constant k , if possible, that will make f continuous:

$$f(x) = \begin{cases} x^2 - k & \text{if } x < 4 \\ kx - 21 & \text{if } x \geq 4. \end{cases} \quad (1)$$

3 Applications

Find the asymptotes of the following function:

$$f(x) = \frac{2x - 1}{x - 1}$$

4 Derivatives

Find the derivative of the following function using the definition:

$$f(x) = 3x^2 - 1, \text{ at } x = 2$$