Chapter Review

Limit Examples

Find the following limits if they exist. If they do not exist, indicate whether the limit tends to $+\infty$, $-\infty$, or neither.

(a) $\lim_{x \to 3} \dfrac{x^3 - 9x}{x^2 - x - 6}$

(b) $\lim_{x \to 3} \dfrac{2 - \sqrt{x+1}}{x^2 - 3x}$

(c) $\lim_{x \to \infty} \dfrac{2x^3 - 4x + 1000}{4x^5 - 3x^2 + 100}$

Chapter Review

Limit Examples

Find the following limits if they exist. If they do not exist, indicate whether the limit tends to $+\infty$, $-\infty$, or neither.

(a) $\lim_{x \to 5} \dfrac{x^2 - 3x - 10}{x - 5}$

(b) $\lim_{x \to 0} \dfrac{-1/(x+2) + 1/2}{x}$

(c) $\lim_{x \to \infty} \dfrac{2x^2 - 7x^4}{4x^2 + 5x - 6}$

Chapter Review

Continuity Example

Is the following function continuous at $x = 0$ and $x = 1$?

$$f(x) = \begin{cases} 0 & \text{if} \quad x < 0 \\ \sqrt{1 - x^2} & \text{if} \quad 0 \leq x \leq 1 \\ x - 1 & \text{if} \quad x > 1 \end{cases}$$

(You must use limits to justify your answer.)

Chapter Review

Continuity Example

Find the value of the constant k that makes the function below continuous.

$$f(x) = \begin{cases} x^3 + k & \text{if } x \leq 3 \\ kx - 5 & \text{if } x > 3 \end{cases}$$

(You must use limits to justify your answer.)

Chapter Review

Definition of the Derivative Example

Use the definition of the derivative to find $f'(x)$ if $f(x) = \sqrt{5 - x}$.

Chapter Review

Definition of the Derivative Example

Use the definition of the derivative to find the equation of the tangent line of the curve

$$f(x) = 6 - x^2$$

when $x = -1$.