2.5-Continuity

Definitions:

\[ f \text{ is } \textit{continuous} \text{ at } x = a \]

Removable Discontinuities

Theorems:

Limits inside Continuous Functions

Continuity of Polynomial/Rational Functions

Intermediate Value Theorem

Examples:

If \( f(x) = \begin{cases} 1 - x & \text{if } x \geq 1 \\ -x & \text{if } x < 1 \end{cases} \)

determine whether \( f \) is continuous at \( x = 1 \) or not. Explain your answer precisely.
If \( f(x) = \begin{cases} 
  x^2 - 9 & \text{if } x \neq 3 \\
  x - 3 & \text{if } x = 3 
\end{cases} \)
determine whether \( f \) is continuous at \( x = 3 \) or not. Explain your answer precisely.

Compute \( \lim_{{x \to 2}} \cos \left( \frac{x - 2}{{x^2 - 4}} \pi \right) \)

Prove the existence of the number \( \sqrt{2} \) by proving there is at least one solution to the equation \( x^2 = 2 \).

On Your Own: #1, 3, 9, 15, 17, 23, 29, 33, 37, 39, 43, 47