LIM	AP CALCULUS AB	
1	Topic: 1.6	Determining Limits Using Algebraic Manipulations
1	Topic: 1.7	Selecting Procedures for Determining Limits

Learning Objective LIM-1.E: Determine the limits of functions using equivalent expressions for the function or the squeeze theorem.

Evaluating Basic Limits Analytically

Basic Limit Rules

Let *b* and *c* be real numbers and *n* be a positive integer.

1. $\lim_{x\to c} b = b$
2. $\lim_{x\to c} x = c$
3. $\lim_{x\to c} x^n = c^n$

The following rules outline how to evaluate the limit of some rather simple functions.

Evaluate each of the following limits analytically.

Example 1: Find $\lim_{x\to 3} 5$.

Example 2: Find $\lim_{x\to 2} (4x^2 + 3)$

Example 3: Find $\lim_{x\to 1} \frac{x^2+x+4}{x+1}$.

Example 4: Find $\lim_{x\to \frac{\pi}{2}} \sin x$

Functions That Agree At All But One Point

Let *c* be a real number and let $f(x) = g(x)$ for all $x \neq c$ in the open interval containing *c*.

Then $\lim_{x\to c} f(x) = \lim_{x\to c} g(x)$.

Factor and Cancel Problems

Example 5: Find $\lim_{x\to -3} \frac{x^2+x-6}{x+3}$

Example 6: Find $\lim_{x\to 1} \frac{x^3-1}{x-1}$

Conjugate Problem

Example 7: Find $\lim_{x\to 0}\dfrac{\sqrt{x+1}-1}{x}$

"Fraction Action Problem"

Example 8: Find $\lim_{x\to 0}\dfrac{\dfrac{1}{x+3}-\dfrac{1}{3}}{x}$

A Problem with "*x* +*h*"

Example 9: Find $\lim_{h\to 0}\dfrac{4(x+h)^2-3(x+h)+2-4x^2+3x-2}{h}$

A Problem with a Piecewise Function

Example 10: Find $\lim_{x\to 2} f(x)$ for $f(x)=\begin{cases}3x^2-1, & x\geq 2\\ 5x+2, & x<2\end{cases}$