Course Number

Instructor

Date

Section 12.2 Techniques for Evaluating Limits

Objective: In this lesson you learned how to find limits by direct substitution and by using the dividing out and rationalizing techniques.

I. Dividing Out Technique (Pages 825–826)

What you should learn
How to use the dividing out technique to evaluate limits of functions

Describe what is meant by the term **indeterminate form.**

The fraction 0/0 that results when direct substitution produces 0 in both the numerator and the denominator. It has no meaning as a real number and is called an indeterminate form because it is not possible to determine the limit from the form alone.

When you try to evaluate a limit of a rational function by direct substitution and encounter the indeterminate form 0/0, you can conclude ________ that the numerator and denominator must have a common factor ________.

The validity of the dividing out technique stems from ____ the fact that when two functions agree at all but a single number *c*, they must have identical limit behavior at $x = c$ ________.

Example 1: Find the limit: $\lim_{x \to 3} \dfrac{x^2 - 8x + 15}{x - 3}$.

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II. Rationalizing Technique (Page 827)

What you should learn
How to use the rationalizing technique to evaluate limits of functions

Another way to find the limits of some functions is to first rationalize the numerator of the function. This is called the ____ rationalizing technique ____.

Recall that rationalizing the numerator means ____ multiplying the numerator and denominator by ________ the conjugate of the numerator ________.

III. Using Technology (Page 828)

> ***What you should learn***
> How to approximate limits of functions graphically and numerically

To find limits of nonalgebraic functions, you often need to use more sophisticated analytic techniques such as a numerical solution using the table feature of a graphing utility or a graphical solution using the zoom and trace features of a graphing utility.

IV. One-Sided Limits (Pages 829–830)

> ***What you should learn***
> How to evaluate one-sided limits of functions

Describe a **one-sided limit.** The limit at c of the function $f(x)$ as x approaches c from either just the left or just the right. A limit from the left is denoted as $\lim_{x \to c^-} f(x) = L$. A limit from the right is denoted as $\lim_{x \to c^+} f(x) = L$.

Existence of a Limit
If f is a function and c and L are real numbers, then $\lim_{x \to c} f(x) = L$ if and only if both the left and right limits exist and are equal to L.

V. Limits from Calculus (Pages 831–832)

> ***What you should learn***
> How to evaluate limits from calculus

For any x-value, the limit of a *difference quotient* is an expression of the form

$$\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}.$$

Direct substitution into the difference quotient always produces the indeterminate form 0/0.

Homework Assignment

Page(s)

Exercises