**PreCalculus 12.2 Techniques for Evaluating Limits**

**Direct Substitution** – replace the variable with the value that it is approaching and simplify.

Examples: =

**Dividing Out Technique** – Factor the numerator and denominator and look for common factors that you can simplify. Then use Direct Substitution.

Examples:

**Rationalizing Technique** – multiply both the numerator and denominator by the conjugate of the numerator. Then use Direct Substitution.

Examples:

**Using Technology to Approximate the Limit**

|  |  |
| --- | --- |
| *x* |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Using a Table**

 Table set: start =

 Δtbl = 0.001

**Using a Graph**

Zoom

Trace

**One-Sided Limits**

 the limit of the function from the left side

 the limit of the function from the right side

**Evaluating One-Sided Limits**

Example: Find the limit as from the left side and the limit as from the right side for the function:

|  |  |
| --- | --- |
| *x* |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Existence of a Limit**

 If *f* is a function and *c* and *L* are real numbers

 iff both the left and right limits exist and are equal to the same value *L*

**A Limit from Calculus**

Example: for the function given by

 Find:

Example: for the function given by

 Find:

Example: for the function given by

 Find:

Example: for the function given by

 Find: