**Calculus Section 1.2 Limits**

-Estimate a limit using a numerical or graphical approach.

Homework: pages 55-58

#’s 2, 5, 15-25, 58, 67-70

-Learn different ways that a limit can fail to exist.

-Learn how to write a limit.

The **limit** is the value of f(x) as x approaches a certain number.

A limit is written as: **** where:

- lim is the abbreviation of the word limit

 -  means that the value of x is approaching a number c

 - f(x) is the function

 - L is a constant number and the value of the limit

This limit is read: “The limit as x approaches c of f(x) equals L” or “The limit of f(x) as x approaches c of f(x) equals L.”

**Example**: Find the limit of a function numerically.

Find 

 x approaches 1 from the left x approaches 1 from the right

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | 0.75 | 0.9 | 0.99 | 0.999 | 1 | 1.001 | 1.01 | 1.1 | 1.25 |
| f(x) |  |  |  |  |  |  |  |  |  |

Answer:

**Example:** Find the limit of a function graphically.

Find 

Answer:



**Example:** Graph and find the limit as x approaches zero of the function:



|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x |  |  |  |  |  |  |  |
| f(x) |  |  |  |  |  |  |  |

 Answer:

Observation about limit:

In general, the **limit** **exists** for a function if the left and the right limits approach the same number. This is regardless of whether the value of f(x) at the limit is equivalent to the limit or exists at all at that point.



 

 

 Answer: 

**Limits that Do Not Exist**

**1)** The \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_ limits are different.





**2)** Unbounded Behavior







**3)** Oscillating Behavior \*Exception to Oscillating Behavior



