**Colorado Technical University**

**Course:** MATH205 – Differential Calculus

#### Unit 2 Part 4 Readings: Limits

**Limits**

In mathematics, a limit is the value that a function "approaches" as the input

"approaches" some value

The symbols are new:

means you are trying to find out what value the function

approaches as the x-input approaches 1

Limits describe how a function behaves near a point, instead of at that point

This simple yet powerful idea is the basis of all of calculus.

Some limits are easy:

To evaluate: Just plug in x = 0 and solve!

Rules for Limits:

Sometimes we can't work the value out directly, but we can see what it should be

as we get closer and closer!

To evaluate: set up tables to see if there is a pattern in the function as

the x values approach 1

Be sure to make both an “up” table and a “down” table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | (x2 − 1)  (x − 1) |  | x | (x2 − 1)  (x − 1) |
| 0.5 | 1.50000 |  | 1.5 | 2.50000 |
| 0.9 | 1.90000 |  | 1.1 | 2.10000 |
| 0.99 | 1.99000 |  | 1.01 | 2.01000 |
| 0.999 | 1.99900 |  | 1.001 | 2.00100 |
| 0.9999 | 1.99990 |  | 1.0001 | 2.00010 |
| 0.99999 | 1.99999 |  | 1.00001 | 2.000 |

is undefined, but is 2

Chart, line chart

Description automatically generatedSome limits are different “up” vs “down”

We say the limit x->2 **DOES NOT EXIST**

But limits do exist coming down from the top and going

up from the bottom

We call these “right-sided limits” (x values coming down)

and “left-sided limits” (x values coming up)

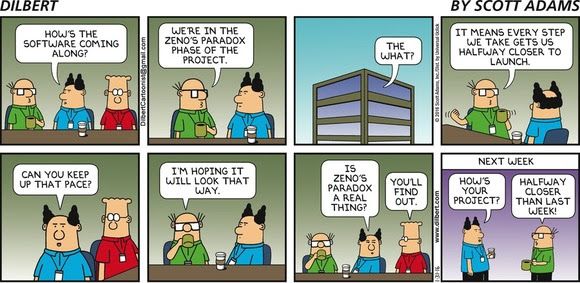
These are symbolized:

left-side limit = 2

for left-sided limits and

right-side limit = 1

for right-sided limits

Text

Description automatically generated with low confidence



And what part of

don’t you understand?