Bell Work

Graph then state the domain, range, x-intercept, y-intercept, vertical and horizontal asymptotes, holes. If an item does not exist, write 'none'

$$y = \frac{x^2 - 25}{x - 5}$$

Follow up question...

How would this change if we had:

$$y = \frac{x - 5}{x^2 - 25}$$

PRE-CALC TRIG

Day 71

12.1 Limits an Intro to Calculus

- **Objective:** Use definition of limits to determine if limits exist and evaluate them

Definition of Limit

If $f(x)$ becomes arbitrarily close to a unique number L
as x *approaches c from either side*,
the limit of $f(x)$ as x approaches c is L.

$$\lim_{x \to c} f(x) = L$$

Estimating a Limit Numerically (whether f(x) at x = c exists or not)

- Example 1: $\lim\limits_{x \to 2} (3x - 2)$

x	1.9	1.99	1.999	**2.0**	2.001	2.01	2.1
- f(x) |

Estimating a Limit Numerically (whether f(x) at x = c exists or not)

Example 1: $\quad \lim_{x \to 2} (3x - 2)$

x	1.9	1.99	1.999	**2.0**	2.001	2.01	2.1
f(x)	3.7	3.97	3.997	___	4.003	4.03	4.3

Two sets (one from both the left and the right) of x-values approach 4…

Example 1 Solution:

$$\lim_{x \to 2} (3x - 2) = 4$$

* Note: You can find the limit with direct substitution 3(2) – 2 = 4 *

Example 2: $\lim\limits_{x \to 2} \dfrac{x-2}{x^2-4}$

x	1.9	1.99	1.999	**2.0**	2.001	2.01	2.1
f(x)							

Example 2: $\lim\limits_{x\to 2}\dfrac{x-2}{x^2-4}$

x	1.9	1.99	1.999	**2.0**	2.001	2.01	2.1
f(x)	.2564	.2506	.25006	____	.2499	.2493	.2439

Example 2 Solution

Two sets (one from both the left and the right) of x-values approach 0.25...

$$\lim_{x \to 2} \frac{x-2}{x^2-4} = 0.25$$

Even though x=2 is undefined we say the limit as x approaches 2 is 0.25

Example 3: $\lim\limits_{x \to 3} \dfrac{x+3}{x^2-9} = \dfrac{x+3}{(x+3)(x-3)}$

x	2.9	2.99	2.999	**3.0**	3.001	3.01	3.1
f(x)	-10	-100	-1000	___	1000	100	10

$\lim\limits_{x \to 3} \dfrac{x+3}{x^2-9}$ does not exists…

Because f(x) is not approaching a unique number L as x approaches 3 we can conclude that this limit does not exist.

Additional Note on Example 3

Note: $\lim_{x \to -3} \dfrac{x+3}{x^2-9} = -0.17$

Therefore, a hole exists at -3

and a vertical asymptote at 3

For next time…

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