

Tuesday, September 4

$$f(x) = 3x^2 - 4x - 2$$

$$\sqrt{\left(\frac{2}{3}, -\frac{10}{3}\right)} \checkmark$$

intercepts:

① y-int: (set $x=0$)

$$f(0) = 3(0)^2 - 4(0) - 2 = -2$$

$$\sqrt{(0, -2)} \checkmark$$

② x-int: (set $y=0$)

$$0 = (3)x^2 + (-4)x + (-2)$$

(does not factor)

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

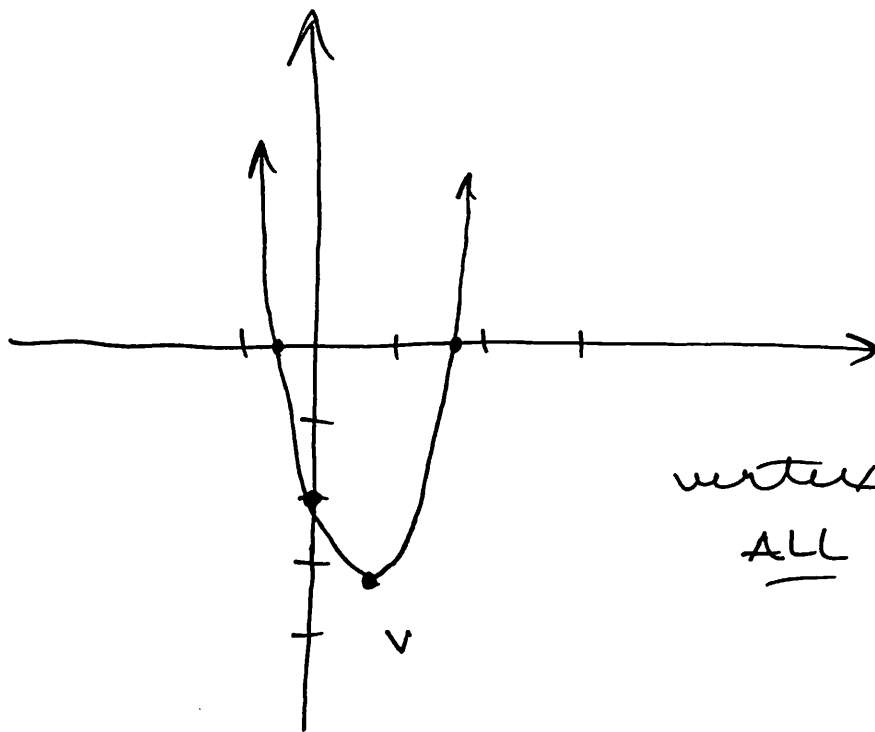
$$x = \frac{4 \pm \sqrt{16 - 4(3)(-2)}}{2(3)}$$

$$x = \frac{4 \pm \sqrt{40}}{6} = \frac{4 \pm \sqrt{4 \cdot 10}}{6}$$

$$x = \frac{4 \pm 2\sqrt{10}}{6} = \frac{2 \pm \sqrt{10}}{3} \rightarrow \frac{2 + \sqrt{10}}{3} \approx \frac{1.72}{3}$$

$$\sqrt{(1.72, 0)} \text{ ; } \sqrt{(-.38, 0)}$$

$$\downarrow \frac{2 - \sqrt{10}}{3} \approx \frac{-.38}{3}$$



vertex \dot{v}
All intercepts

Polynomial

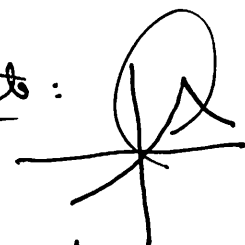
$$f(x) = \underbrace{a_n}_{(n)} x^{\underbrace{n}} + \underbrace{a_{n-1}}_{(n-1)} x^{\underbrace{n-1}} + \underbrace{a_{n-2}}_{(n-2)} x^{\underbrace{n-2}} + \dots + a_2 x^{(2)} + a_1 x^{(1)} + \underbrace{a_0}$$

{ All exponents are non-negative integers

① continuous

② "smooth" ✓



not: 
 not polynomial.

3

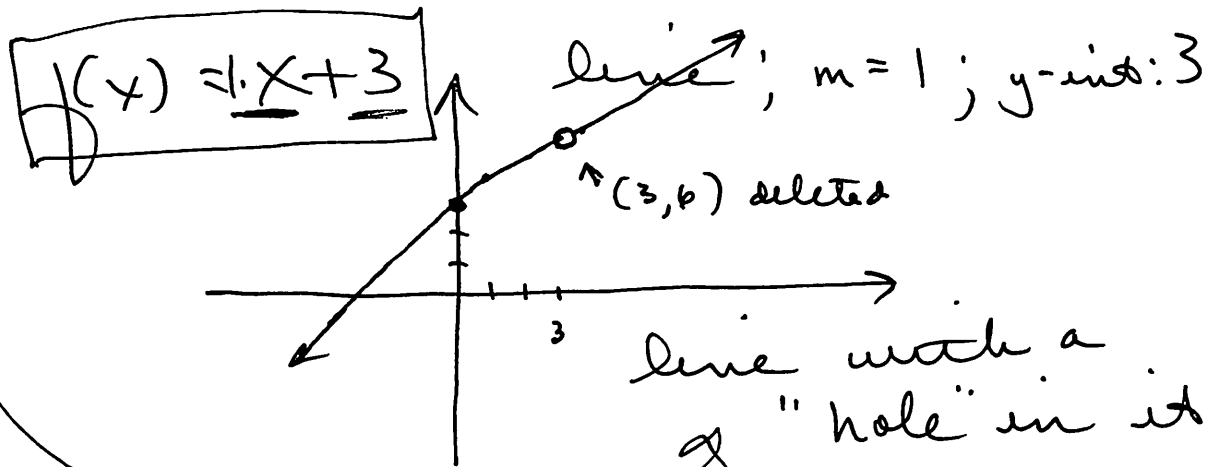
rational functions: (not polynomial)

$$f(x) = \frac{2x+1}{x-3}$$

\leftarrow polynomial
 \leftarrow $x \neq 3$ $x=3$ v.A.

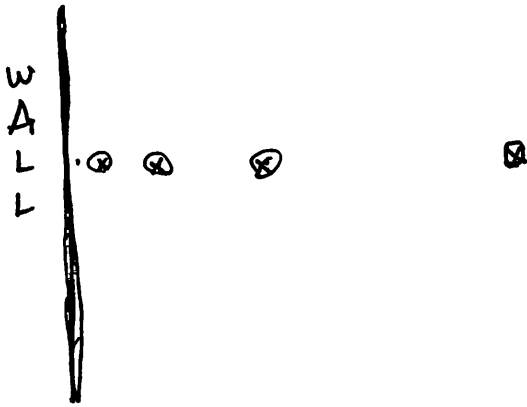
$$f(x) = \frac{x^2-9}{x-3} = \frac{(x-3)(x+3)}{(x-3)}$$

$x \neq 3$ 1 $x=3.001$



1.1: LIMITS

④



LIMIT (=) WALL

no need to get to
the wall to have
limit as the wall.

$$\lim_{x \rightarrow a} f(x) = L \quad (\text{2-sided limit})$$

x is appr. a

one-sided
limits

$$\lim_{x \rightarrow a^+} f(x) = L \quad (\text{from the right})$$
$$\lim_{x \rightarrow a^-} f(x) = L \quad (\text{from the left})$$

$$f(x) = 5x + 1$$

$$\lim_{x \rightarrow 2^+} (5x + 1) = 11$$

"from the right"

x	y
2.1	11.5
2.01	11.05
2.001	11.005
⋮	⋮
2	11

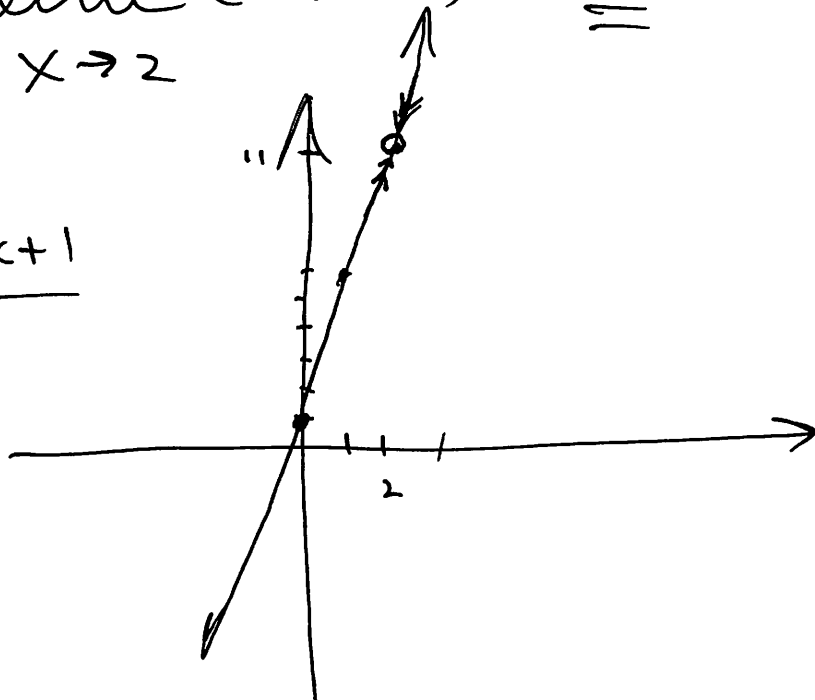
$$\lim_{x \rightarrow 2^-} (5x + 1) = 11$$

"from the left"

x	y
1.9	10.5
1.99	10.95
1.999	10.995
⋮	⋮
2	11

$$\lim_{x \rightarrow 2} (5x + 1) = 11$$

y = 5x + 1
(2, 11)



$$g(x) = \begin{cases} 3x+4, & x \leq 1 \\ 2x-1, & x \geq 1 \end{cases}$$

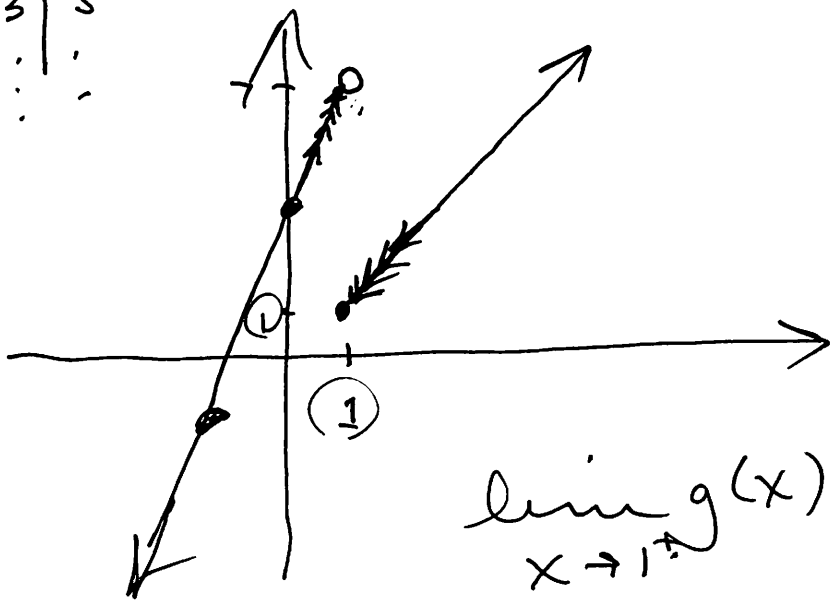
$y = 3x + 4$

x	y
1	7
0	4
-1	1
...	...

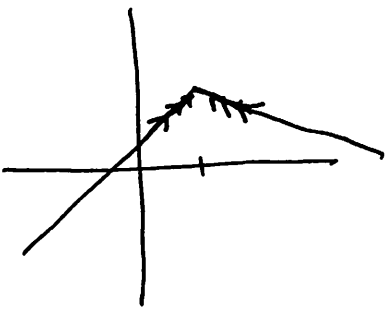
$y = 2x - 1$

x	y
1	1
2	3
3	5
...	...

$\lim_{x \rightarrow 1} g(x) = \text{D.N.E.}$
 a limit does not exist

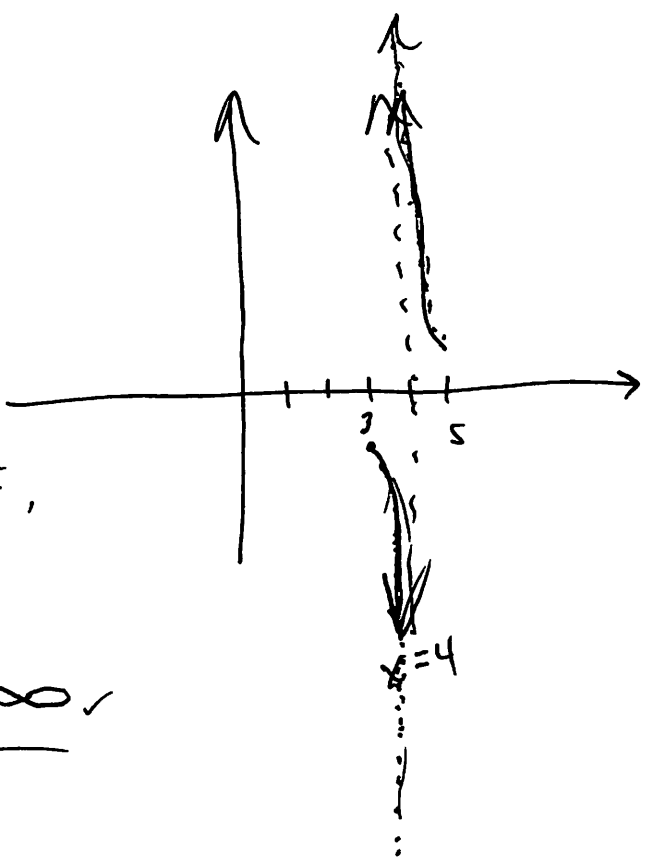


$\lim_{x \rightarrow 1^-} g(x) = 7$
 $\lim_{x \rightarrow 1^+} g(x) = 1$



$$f(x) = \frac{1}{x-4}$$

(7)



$$\lim_{x \rightarrow 4} f(x) = \underline{\text{D.N.E.}}$$

$$\lim_{x \rightarrow 4^+} f(x) = \underline{+\infty}$$

$$\lim_{x \rightarrow 4^-} f(x) = \underline{-\infty}$$

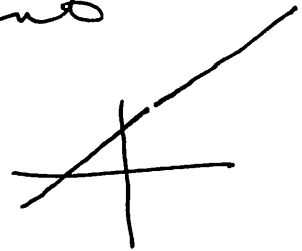
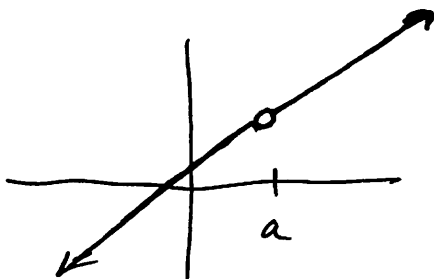
1.2: CONTINUITY

(8)

check at $x=a$:

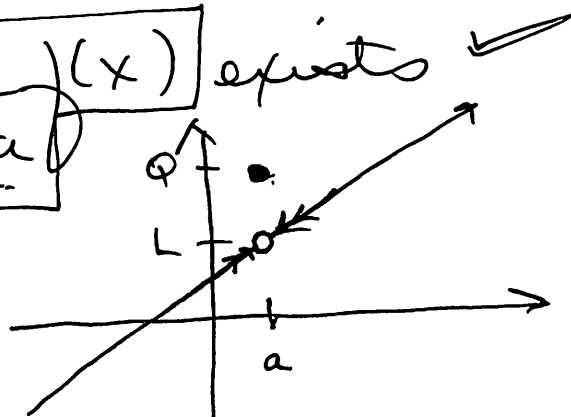
1.) $f(a)$ exists ✓

"is there a point plotted there?"



not contin

2.) $\lim_{x \rightarrow a} f(x)$ exists ✓



(a, Q)

3.) $\lim_{x \rightarrow a} f(x) = f(a)$

(a, Q)
 $LIM \neq L$

$$Q \neq L$$

\therefore DISCON.

$$f(x) = 5x + 4$$

is continuous at $x = 4$?

① $f(4) = 24$ $(4, 24)$

② $\lim_{x \rightarrow 4} (5x + 4) = 24$

③ $\lim_{x \rightarrow 4} (5x + 4) \stackrel{??}{=} f(4)$

121-001:

--Free drop-in tutoring for 100 and 200 level math classes is available in SAS 2105 starting Tuesday September 4.

--The tutoring hours, new this semester, are 9-5 Mondays through Thursdays and Fridays from 9-4.

--Undergraduates will now be required to sign in when they arrive to receive tutoring, both on the whiteboard (so tutors can keep track of who is in SAS 2105 to receive tutoring and who is there to work on their own) and on a clipboard located near the whiteboard (so I can collect data on tutoring center utilization and provide recommendations on staffing numbers for future semesters.)

--The tutor schedule, which is not yet finalized but will be by the end of the week, can be found here.

There are signs placed throughout SAS 2105 which should make the new procedures clear.

If you or your students have any questions, comments, or concerns about MMC tutoring, feel free to **contact me** at kaahrens@ncsu.edu.

121-001:

The Alma Mater of NC State

Where the winds of Dixie softly blow o'er the fields of Caroline,
 There stands ever cherished, N.C. State, as thy honored shrine
 So lift your voices! Loudly sing from hill to oceanside!
 Our hearts ever hold you, N.C. State in the folds of our love
 and pride

Words by Alvin Fountain : Class of '22

Music by Bonnie Norris: Class of '23

Compliments of the Union Activities Board

uab.ncsu.edu

121:

9/4:
TUES
 1.1, 1.2

9/6
THURS
 1.3, 1.4

9/11
TUES
 1.5, 1.6;
 REVIEW

9/13
THURS
 TEST #1
 (BONUS:
 ALMA MATER)