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

$(0, -2)$

$(1.72, 0) \; \vdots \; (-.39, 0)$

① continuous

② "smooth"

Polynomial :

$$f(x) = a_n \boxed{x^n} + a_{n-1} \boxed{x^{n-1}} + a_{n-2} \boxed{x^{n-2}} + \cdots +$$
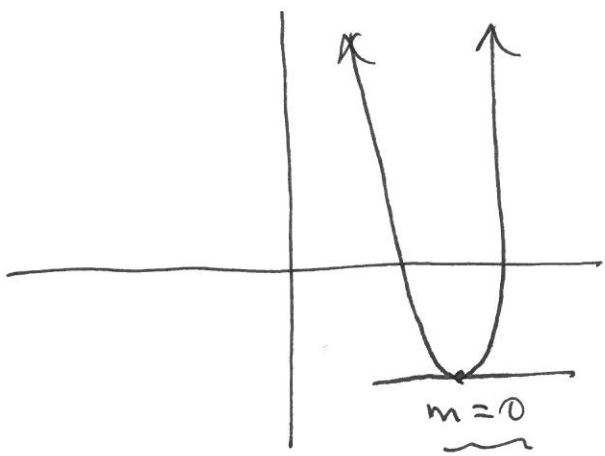
$$a_2 \boxed{x^2} + a_1 \boxed{x^1} + a_0 \boxed{x^0}$$

(all exponents are non-neg.)
integers

not smooth:

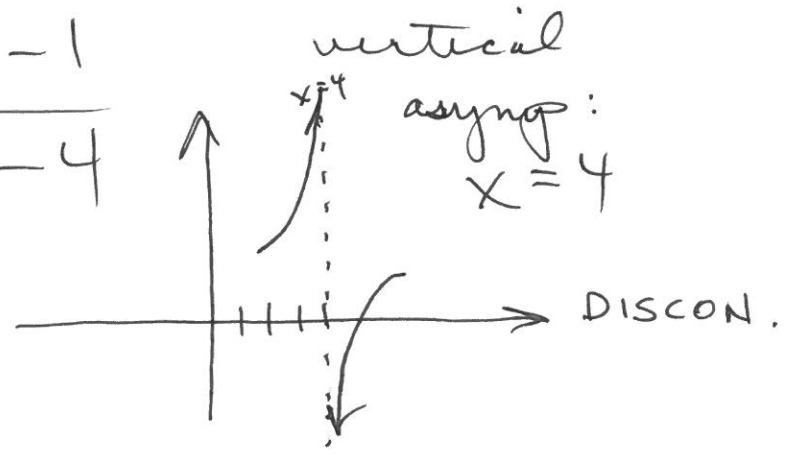corner; cusp;

not a polynomial

$m = 0$

$V\left(\dfrac{-b}{2a}, m\right)$

rational function: (not polynom.)

$$f(x) = \frac{\text{Polynom.}}{\text{Polynom.}}$$

$$f(x) = \frac{2x - 1}{x - 4}$$

4.001

vertical asymp:

$x = 4$

$x = 4$

DISCON.

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

3.00001

$$g(x) = \frac{(x-3)(x+3)}{x-3}$$

3.00001

<u>no</u> vert. asymp.
at $x = 3$

$x \neq 3$

$$g(x) = x + 3 \qquad m = 1$$
$$y\text{-int}: 3$$
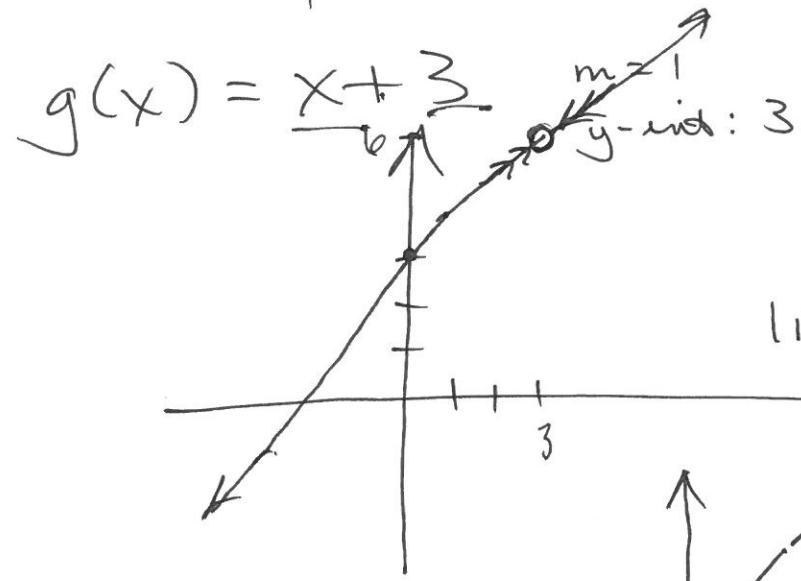
omit

$$(3, \underline{6})$$

line with a
"hole" in it
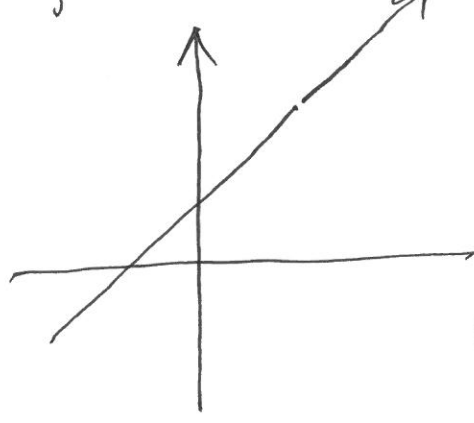
$$g(x) = \frac{x^2 - 9}{x - 3}$$

$$g(x) = x + 3$$

1.1: LIMITS

W
A
L
L | ⊗ · ⊗ · ⊗ · · · ⊗
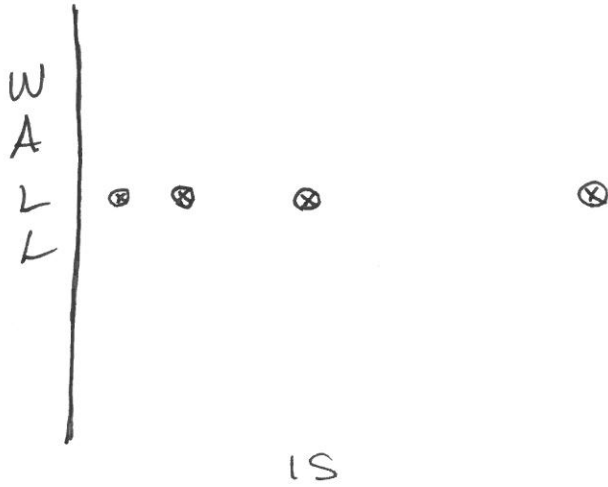
"move half the
distance to the
wall"

IS

$\underline{LIM} \left(=\right) WALL$

$$\lim_{x \to a} \boxed{f(x)} = L \quad \longleftarrow$$

(x approaches a) (2-sided limit)

~~$x \neq a$~~

one sided limits $\begin{cases} \text{① } \lim_{x \to a^+} f(x) = \underline{\quad\quad} \\ \quad (\text{appr "a" from the right}) \\ \text{② } \lim_{x \to a^-} f(x) = \underline{\quad\quad} \\ \quad (\text{appr "a" from the left}) \end{cases}$

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

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

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

x	y
2.1	11.5
2.01	11.05
2.001	11.005
②	⑪
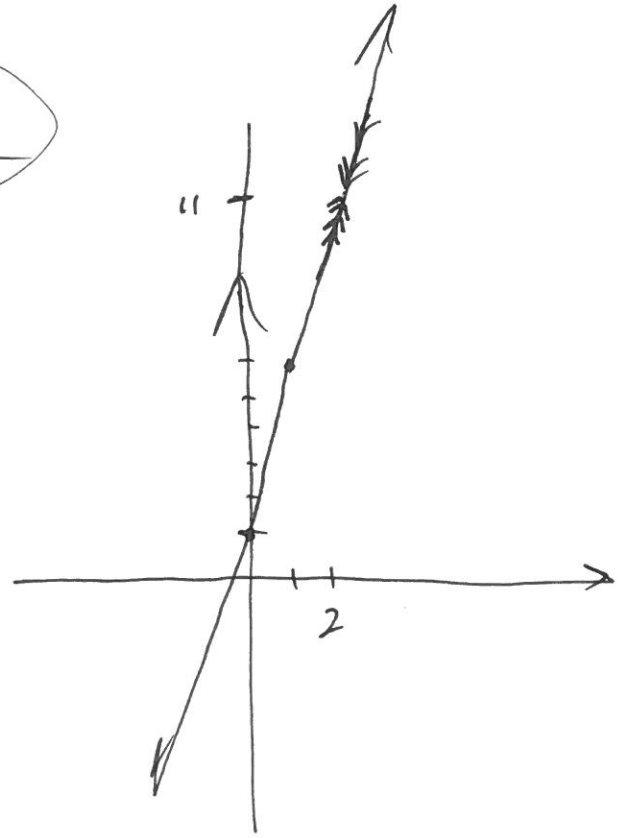
② $\lim_{x \to 2^-} (5(x)+1) = \underline{11}$

x	y
1.9	10.5
1.99	10.95
1.999	10.995
②	⑪

$$g(x) = \frac{x^2 - 9}{x - 3} = \frac{(x-3)(x+3)}{(x-3)} = \boxed{x+3} \quad \boxed{x \neq 3}$$

$\frac{0}{0}$??

$$\lim_{x \to 3} g(x) = \underline{6}$$

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

x=4
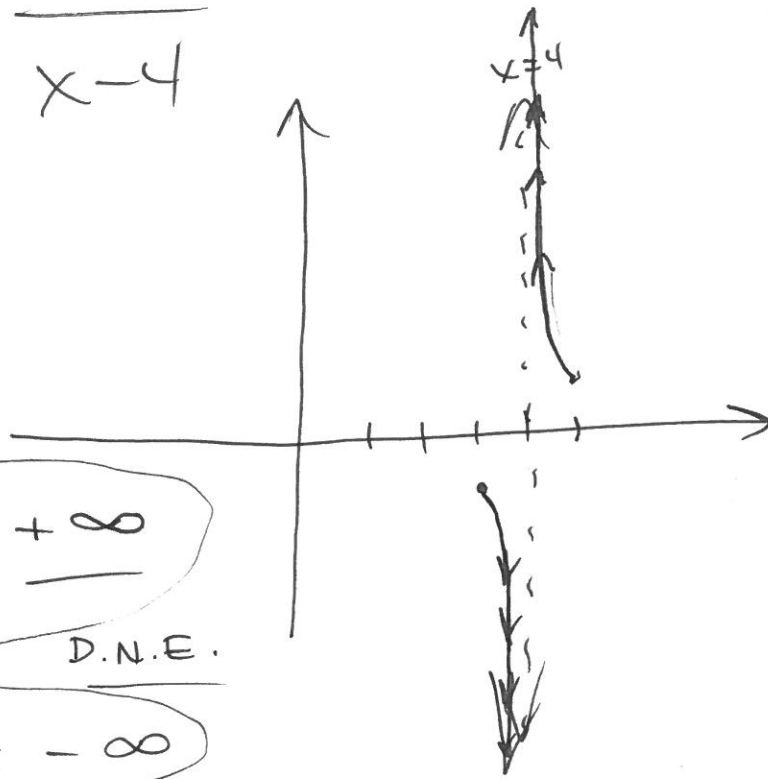
① $\lim\limits_{x \to 4^+} \frac{1}{x-4} = +\infty$

D.N.E.

② $\lim\limits_{x \to 4^-} \frac{1}{x-4} = -\infty$

D.N.E.

$\lim\limits_{x \to 4} \frac{1}{x-4} = $ D.N.E.

a limit does not exist
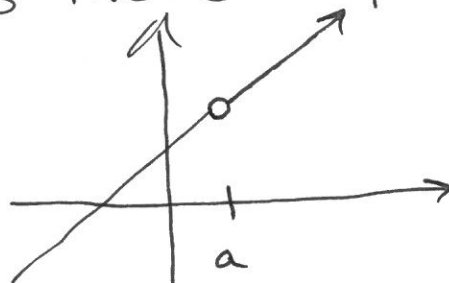
1.2: CONTINUITY
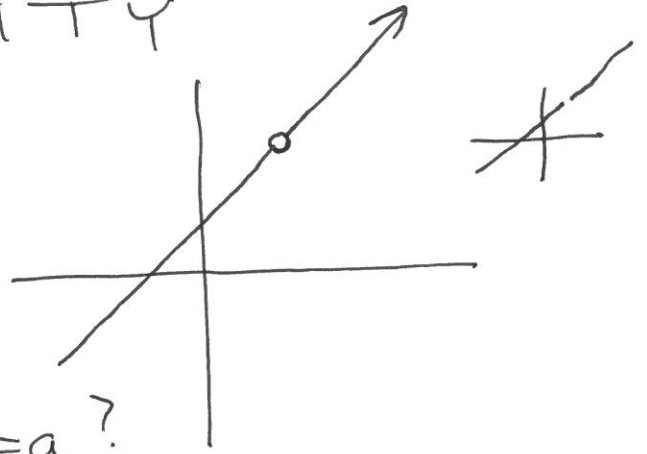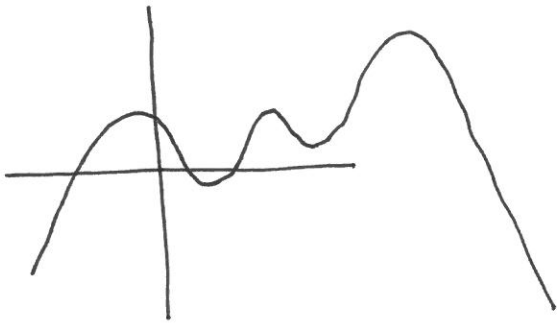
¿ continuous at $x=a$?

① $f(a)$ exists.

"is there a point plotted there?"

no ∴ discon.

② $\lim\limits_{x \to a} f(x)$ exists

no,
$\lim$ D.N.E.
∴ DISCON.

① $f(a)$?:?
(a, Q)
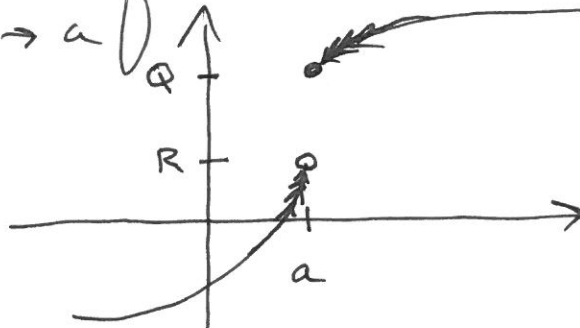
② $\lim\limits_{x \to a} f(x) = \underline{\quad}$

③ $\lim\limits_{x \to a} f(x) \overset{?}{=} f(a)$

① $f(a) = Q$

② $\lim\limits_{x \to a} = R$

③ $\lim = f(a)$
$R \neq Q$ ∴ DISCON.

m a
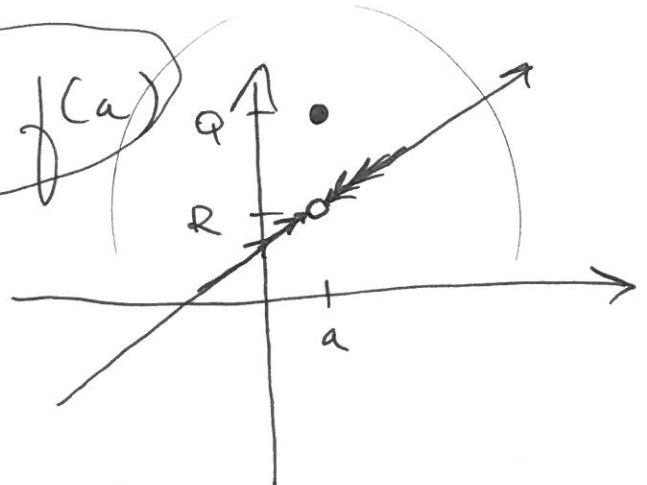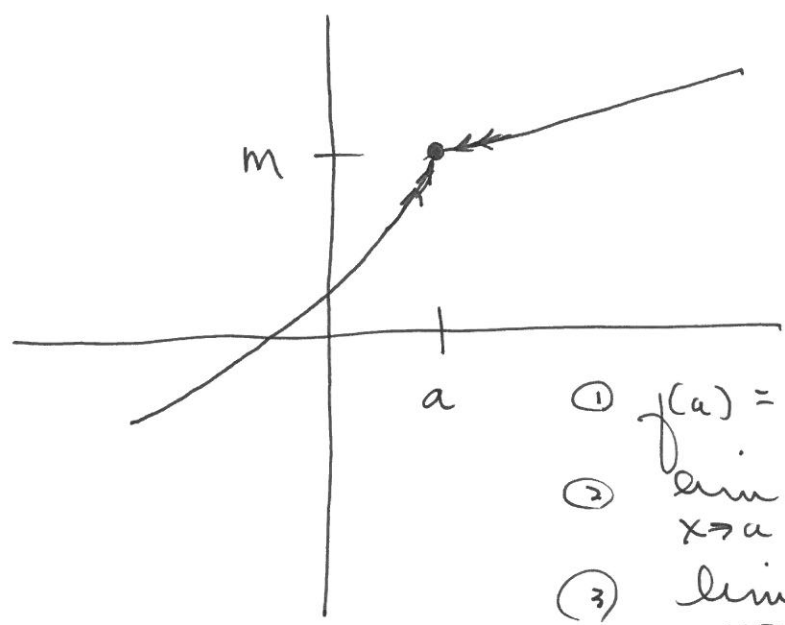
① $f(a) = m$

② $\lim\limits_{x \to a} f(x) = m$

③ $\lim\limits_{x \to a} f(x) \overset{?}{=} f(a)$

        $m = m$

$\therefore$ CONTIN.

121-003:

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

--The tutoring hours, new this semester, are <mark>9–5 Mondays through Thursdays and Fridays from 9–4.</mark>

--Undergraduates will now be required to <mark>sign in</mark> when they arrive to receive tutoring, both on the <mark>whiteboard</mark> (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 <mark>clipboard</mark> 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.

121-003:

9/5	9/10	9/12	9/17
WED:	MON:	WED:	MON:
1.1, 1.2	1.3, 1.4	1.5, 1.6; REVIEW	TEST #1

Subject: Office hours for MA 121 – 003
From: Deepika Chaudhry <dchaudh@ncsu.edu>
Date: 9/5/18, 7:28 PM
To: John Griggs <jrgriggs@ncsu.edu>, Courtney Griggs <cgriggs@ncsu.edu>, Chuan Xu <cxu9@ncsu.edu>

121 - 003

Hi Dr. Griggs,

My office hours for MA 121 – 003 are as follows:
Mondays: 10:45am – 11:30 am at DAN 222
Tuesdays: 8:00 am – 10:15 am at DAN 214
Please let me know if there's any more information you need.

Respectfully,
Deepika Chaudhry
M.S. Financial Mathematics| North Carolina State University
B.Tech Electrical Engineering | Indian Institute of Technology, Mandi
c. +1 (919) 591 4966|Linkedin

121-003:

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**

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FAITH & FAMILY DAY

SATURDAY, SEPTEMBER 8

VS. GEORGIA STATE
KICKOFF: 12:30 PM
CARTER-FINLEY STADIUM

(11:30 PNC)
ARENA

$30 RESERVED TICKETS

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