MA121-001
Thursday, September 6

(1)

1.1 : LIMITS

$$f(x) = \frac{2x+1}{5x^2-8x+11} \qquad y=0$$

$$\lim_{x\to\infty} \frac{2x+1}{5x^2-8x+11} = 0 \qquad \text{HORIZONTAL ASYMPTOTE}$$

$$\lim_{x\to\infty} \frac{\frac{2x}{x^2} + \frac{1}{x^2}}{\frac{5x^2}{x^2} - \frac{8x}{x^2} + \frac{11}{x^2}} = \lim_{x\to\infty} \frac{\frac{2}{x} + \frac{1}{x^2}}{5 - \frac{8}{x} + \frac{11}{x^2}} = \frac{0}{5} = 0$$

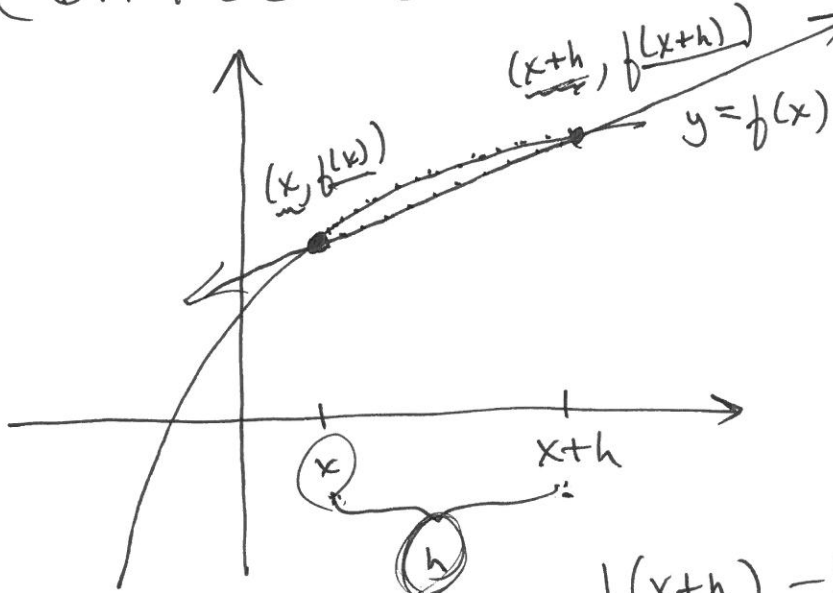$$\lim_{x\to\infty} \frac{2x+1}{5x-3} = \lim_{x\to\infty} \frac{\frac{2x}{x} + \frac{1}{x}}{\frac{5x}{x} - \frac{3}{x}}$$

$$= \lim_{x\to\infty} \frac{2 + \frac{1}{x}}{5 - \frac{3}{x}} = \frac{2}{5}$$

$$\lim_{x\to\infty} \frac{2x^2 - x + 5}{3x+1} = \text{D.N.E.} \qquad \frac{11}{2} \ldots \frac{20}{3} \ldots \frac{50}{4}$$

$$\ldots\ldots 10{,}000 \ldots\ldots$$

$$\lim_{x\to\infty} \frac{\frac{2x^2}{x^2} - \frac{x}{x^2} + \frac{5}{x^2}}{\frac{3x}{x^2} + \frac{1}{x^2}} = \lim_{x\to\infty} \frac{2 - \frac{1}{x} + \frac{5}{x^2}}{\frac{3}{x} + \frac{1}{x^2}}$$

1.3:

AVERAGE RATE OF CHANGE
(SLOPE OF THE SECANT LINE) ✓2 pts
(DIFFERENCE QUOTIENT) ✓

$x =$ initial x-value

$h =$ change in x

$$m_{sec} = \frac{f(x+h) - f(x)}{(x+h) - x} = \boxed{\frac{f(x+h) - f(x)}{h} = m_{sec}}$$

$$f(x) = 3x^2 - 5x + 11$$

find the simplified difference quotient:

$(x+h)^2 = x^2 + 2xh + h^2$

$$\frac{f(x+h) - f(x)}{h} = \frac{[3(x+h)^2 - 5(x+h) + 11] - [3x^2 - 5x + 11]}{h}$$

$$= \frac{3x^2 + 6xh + 3h^2 - 5x - 5h + 11 - 3x^2 + 5x - 11}{h}$$

$$= \frac{h(6x + 3h - 5)}{h} = \boxed{6x + 3h - 5 = m_{sec}}$$

$(h \neq 0)$

$$\frac{f(x+h) - f(x)}{h} = m_{sec}$$

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

$$\frac{3}{15} - \frac{1}{15} = \frac{3-1}{15}$$

$$m_{sec} = \cfrac{\cfrac{4}{2(x+h)+1} - \cfrac{4}{2x+1}}{h}$$

$$= \left[\frac{4 \quad [2x+1]}{[2(x+h)+1][2x+1]} \ominus \frac{4 \quad [2(x+h)+1]}{[2x+1][2(x+h)+1]} \right] \cdot \frac{1}{h}$$

$$= \frac{4(2x+1) - 4[2(x+h)+1]}{[2(x+h)+1] \cdot [2x+1] \cdot h}$$

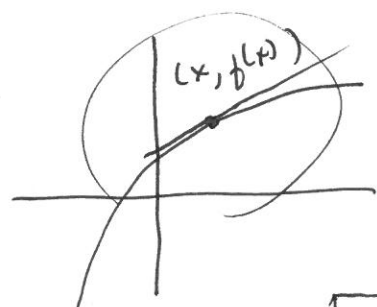$$= \frac{8x + 4 - 8x - 8h - 4}{[2(x+h)+1] \cdot [2x+1] \cdot h} = \frac{h(-8)}{h \cdot [2(x+1)+1] \cdot [2x+1]}$$

$$(h \neq 0)$$
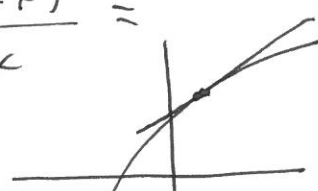
$$= \frac{-8}{[2(x+h)+1] \cdot [2x+1]} = m_{sec}$$

1.4:

CALCULUS

INSTANTANEOUS RATE OF CHANGE

(SLOPE OF THE TANGENT LINE)

$(x, f(x))$

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

$$\boxed{M_{TAN}} = \lim_{h \to 0} \boxed{\frac{f(x+h) - f(x)}{h}} = f'(x)$$

$h = .00000000000000001$

$(h \neq 0)$

* DERIVATIVE

$$f(x) = 3x^2 - 5x + 11 \quad \Big\} \text{ from earlier today}$$

$$M_{SEC} = 6x + 3h - 5$$

$$M_{TAN} = \lim_{h \to 0} (6x + \overset{0}{\cancel{3h}} - 5) = 6x - 5$$

on $f(x) = 3x^2 - 5x + 11$
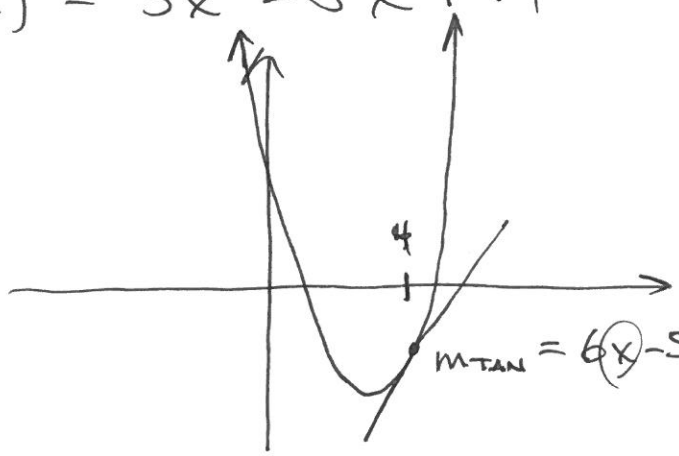
$M_{TAN} = 6x - 5 = 6(4) - 5 = \underline{19}$

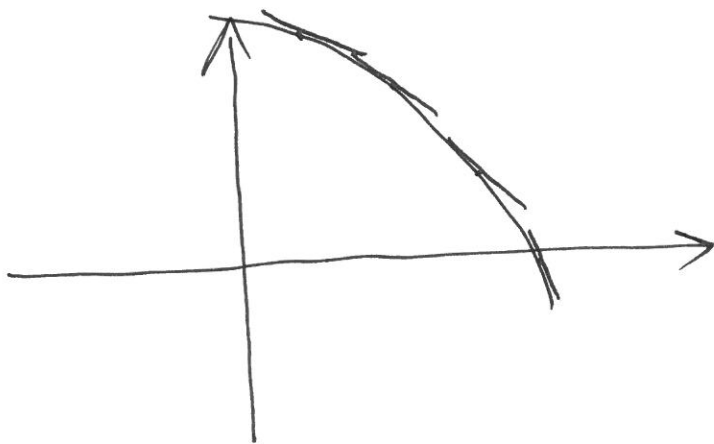$$f(x) = \frac{4}{2x+1} \quad \checkmark \qquad \text{V.A.:} \quad x = \frac{-1}{2}$$

⑤

from earlier today ✓

$$m_{SEC} = \frac{f(x+h) - f(x)}{h} = \frac{-8}{[2(x+h)+1] \cdot [2x+1]}$$

$$m_{TAN} = f'(x) = \lim_{h \to 0} \left[\frac{f(x+h) - f(x)}{h} \right]$$

$$= \lim_{h \to 0} \frac{-8}{[2(x+h)+1] \cdot [2x+1]}$$

$$= \frac{-8}{[2x+1] \cdot [2x+1]} = \frac{-8}{(2x+1)^2}$$

$$m_{TAN} = \boxed{f'(x) = \frac{-8}{(2x+1)^2}} \quad \checkmark \qquad \frac{-}{+} = -$$
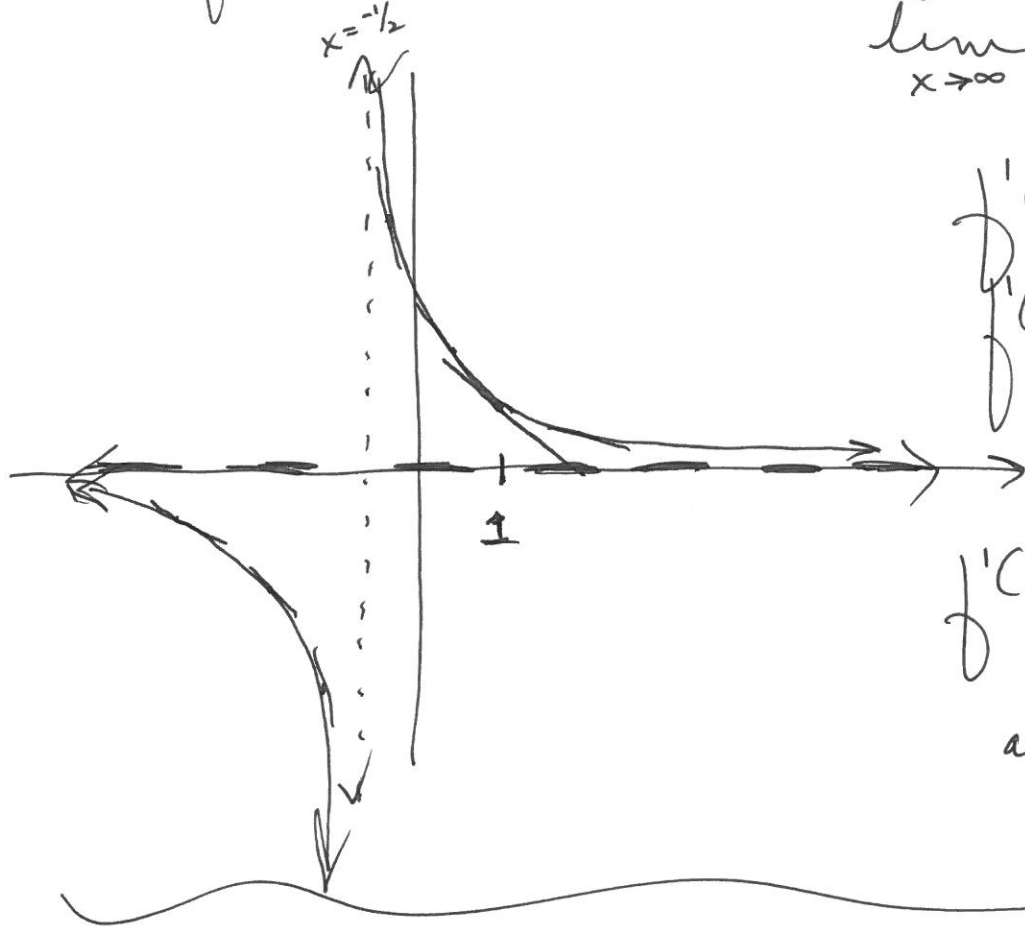
Slope is always NEG

$f(x)$ DECR.

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

V.A.: $\underline{x = -\frac{1}{2}}$

H.A.: $y = 0$

$$\lim_{x \to \infty} \frac{4}{2x+1} = 0$$

$f'(x) = m_{TAN} =$

$$f'(x) = \frac{-8}{(2x+1)^2}$$

$$f'(1) = \frac{-8}{(2(1)+1)^2} = \frac{-8}{9}$$

at $x = 1$

$$m_{TAN} = \frac{-8}{9}$$

$f'(\underline{3}) =$ find the deriv... then let $\underline{\underline{x=3}}$

✳ $\lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h} = f'(x)$ $\underline{\underline{\text{DEF. OF}}}$ $\underline{\underline{\text{DERIV.}}}$

DERIV DOES NOT EXIST

NOT DIFF.

NOT DIFF. (TANGENT LINE IS VERTICAL)
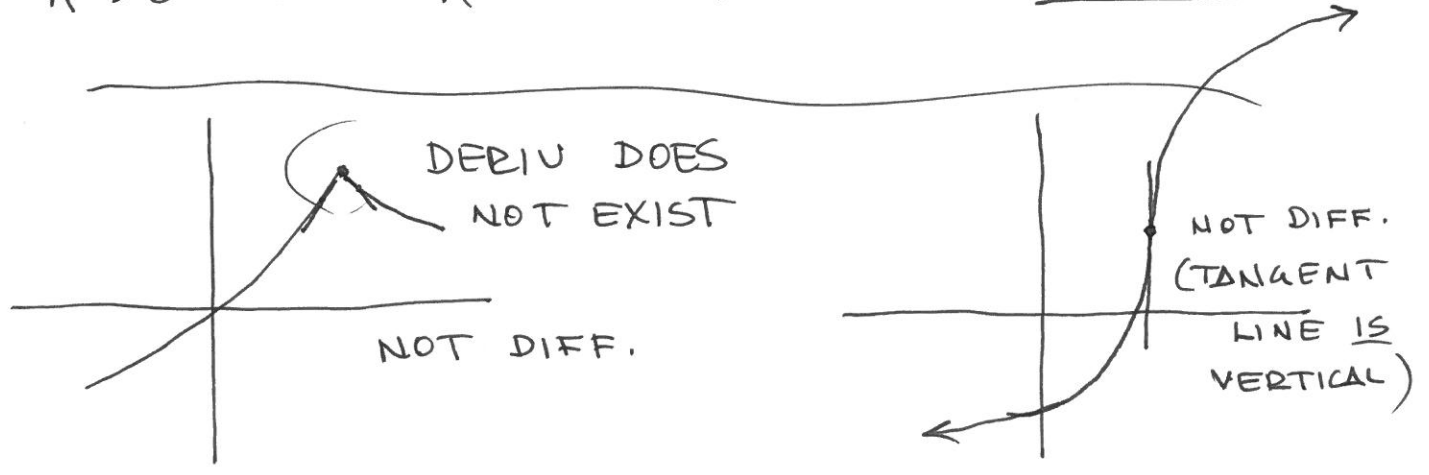
The Alma Mater of NC State

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

Subject: Re: Moodle and office hours
From: Erik Mainellis <ekmainel@ncsu.edu>
Date: 8/23/18, 2:41 PM
To: John R Griggs <jrgriggs@ncsu.edu>

121 - 001

Oh whoops it's SAS 4123.

Erik Mainellis

On Thu, Aug 23, 2018 at 2:40 PM, John R Griggs <jrgriggs@ncsu.edu> wrote:

> Where is your office?
>
> JRG
>
>
> On 8/23/18 2:24 PM, ekmainel@ncsu.edu wrote:
>
>> Hi!
>>
>> I made a Moodle for the course, but I'm not sure how we will enter attendance, so I made an attendance folder. There is a grades section.
>>
>> Also, my office hours are 12:10 – 1:40 on MoWe.
>>
>>
>> Best,
>>
>> Erik Mainellis

Subject: Re: setting up a Moodle page; TA office hours   121-001:
From: Jai Aslam <jkaslam@ncsu.edu>
Date: 9/6/18, 11:48 AM
To: John R Griggs <jrgriggs@ncsu.edu>

Hi Professor Griggs,

I'll do my office hours in my office SAS 3213 from 10-11:30 on Mondays and Wednesdays.

Best,
Jai

On Thu, Aug 23, 2018 at 5:16 PM, Jai Aslam <jkaslam@ncsu.edu> wrote:
> Hi Professor Griggs,
>
> I'll do my office hours in my office SAS 3213 from 10-11:30 on Mondays and Wednesdays.
>
> Best,
> Jai
>
> On Thu, Aug 23, 2018 at 2:38 PM John R Griggs <jrgriggs@ncsu.edu> wrote:
>> Erik, Jai and Wenlong: (MA121-001)
>>
>> Ju, Alexander and Pratik: (MA121-002)
>>
>> Chuan, Courtney and Deepika: (MA121-003)
>>
>>
>> I would like for each group of TAs to get together to set up a Moodle page for your respective section. We will use this Moodle page for test grades and attendance information. Also, I would like for you to send me when and where you will hold your office hours for the class – so I can let the students in each class know when you are available to them for help. Thanks...
>>
>> John Griggs

NC STATE FOOTBALL
FAITH & FAMILY DAY

SATURDAY, SEPTEMBER 8

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

(11:30 PNC)
ARENA

$30 RESERVED TICKETS

HEAR FROM INDIANA STATE FOOTBALL ALL-AMERICAN & 5 TIME NORTH CAROLINA STATE CHAMPION COACH, BOBBY POSS, PRIOR TO THE GAME!

TO PURCHASE TICKETS, CALL RYAN KINDT AT (919) 865-1423 OR PURCHASE ONLINE AT GOPACK.COM/PROMO AND USE PROMO CODE "FAITHANDFAMILY"

Tickets must be purchased prior to game day. Tickets are subject to availability.