

MA 121 - 003 :

Monday, August 27

①

$$y - y_1 = m(x - x_1)$$

pt $(\underline{3}, \underline{-5})$ $m = -\frac{1}{3}$

$$y - (-5) = -\frac{1}{3}(x - 3)$$

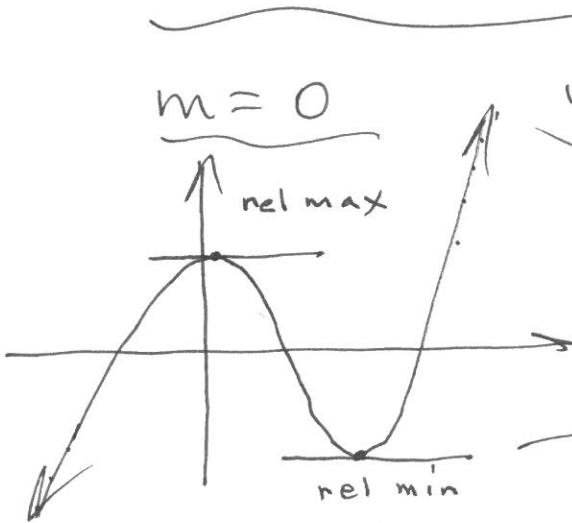
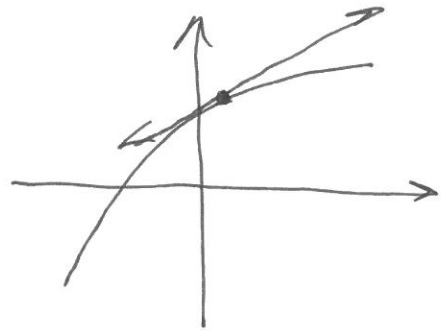
$$3(y + 5) = \cancel{-\frac{1}{3}}(x - 3) \cdot \cancel{3}$$

$$3y + 15 = -x + 3$$

$$x + 3y + 12 = 0 \quad \checkmark$$

$$\frac{3y}{3} = \frac{-x - 12}{3} \quad y = \boxed{-\frac{1}{3}x - 4} \quad \checkmark$$

$$y = -\frac{1}{3}x - 4$$



$$m = 0$$

$$y - y_1 = 0(x - x_1)$$

$$y - y_1 = 0$$

$$y = \underline{\underline{y_1}}$$

tangent line is
HORIZONTAL

(x, y) or $(x, f(x))$ output (2)

$f(x) = x^2 - 2x + 5$ parabola; opens up

$f(1) = 1^2 - 2(1) + 5 = 4$
 $(1, 4)$

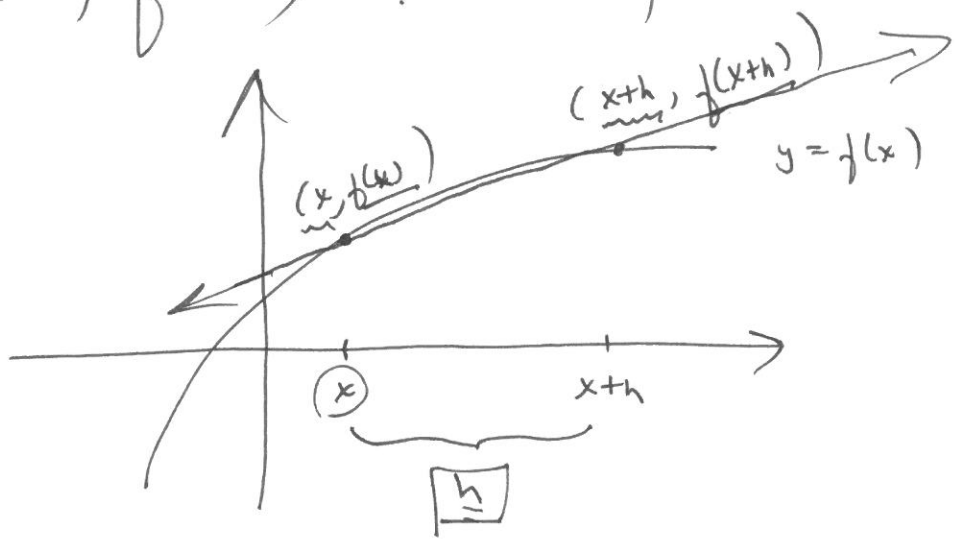
$f(a) = a^2 - 2a + 5$
 $(a, a^2 - 2a + 5)$

$f(x+h) = (x+h)^2 - 2(x+h) + 5$
 $f(x+h) = x^2 + 2xh + h^2 - 2x - 2h + 5$
 $(x+h, x^2 + 2xh + h^2 - 2x - 2h + 5)$

✓ $\frac{f(x+h) - f(x)}{h}$

DIFFERENCE
QUOTIENT
(slope)

$(x, f(x))$ & $(x+h, f(x+h))$



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

$$f(x) = x^2 - 2x + 5 \quad \checkmark$$

$$f(x+h) = x^2 + 2xh + h^2 - 2x - 2h + 5$$

simplified difference quotient

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

$$\frac{(x^2 + 2xh + h^2 - 2x - 2h + 5) - (x^2 - 2x + 5)}{h}$$

$$\frac{x^2 + 2xh + h^2 - 2x - 2h + 5 - x^2 + 2x - 5}{h}$$

$$\frac{h(2x + h - 2)}{h} = 2x + h - 2 \quad (h \neq 0)$$

$\frac{8}{4} = 2$ (check: $2 \cdot 4 \stackrel{?}{=} 8$)

$\frac{0}{3} = 0$ (check: $0 \cdot 3 \stackrel{?}{=} 0$)

$\frac{5}{0} = \infty$ (check: $\infty \cdot 0 \stackrel{?}{=} 5$) no sol

$\frac{0}{0} = 173$ (check: $7 \cdot 0 \stackrel{?}{=} 0$)
(check: $17 \cdot 0 \stackrel{?}{=} 0$) inf. # of sol

↑
indeterminate form

"split domain" function
(piecewise)

~~$f(x) = \begin{cases} 2x-1, & x \leq -1 \\ x^2+4, & -1 < x \leq 2 \\ 3, & x > 2 \end{cases}$~~

2.1
2.01
2.001
⋮

$y = 2x - 1$
($x \leq -1$)

x	y
-1	-3
-2	-5
-3	-7

$y = x^2 + 4$
($-1 < x \leq 2$)

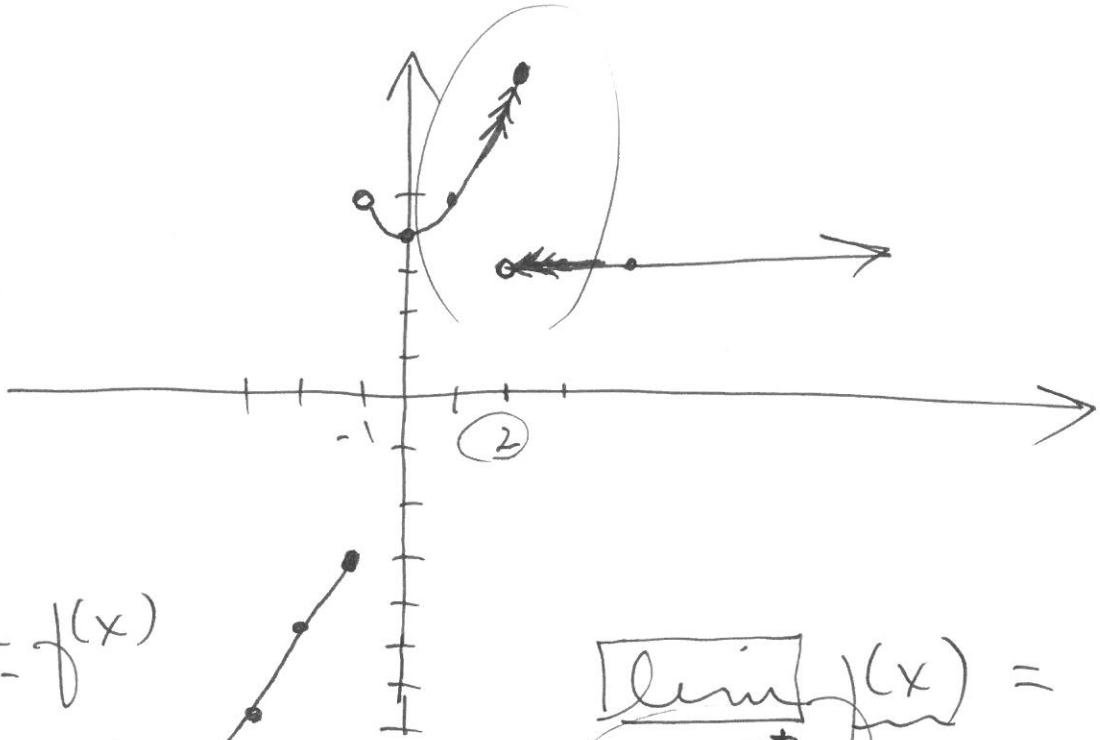
x	y
-1	5
0	4
1	5
2	8

$y = 3$
($x > 2$)

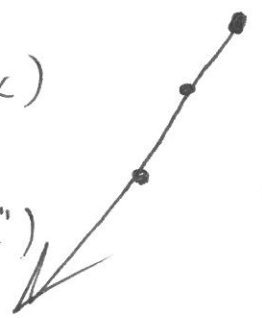
x	y
2	3
3	3
4	3

DELETE

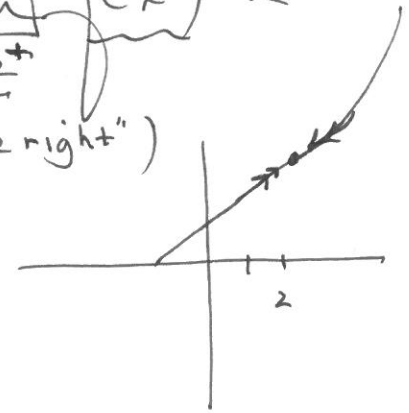
DELETE



$\lim_{x \rightarrow 2^-} f(x)$
("from the left")



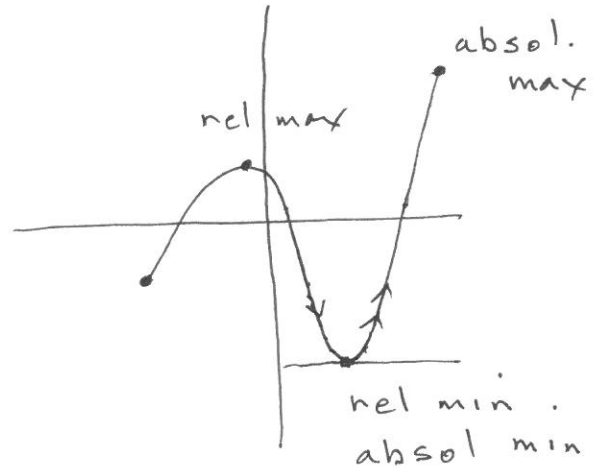
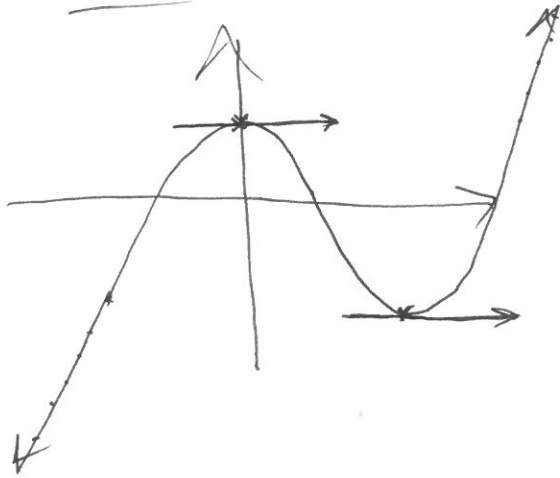
$\lim_{x \rightarrow 2^+} f(x) =$
("from the right")



wednesday, August 22

RI:

max/min (OPTIMIZATION)



ordered pairs 2D

(x, y) $(x, f(x))$ $(t, s(t))$

$(t, v(t))$ $(t, a(t))$

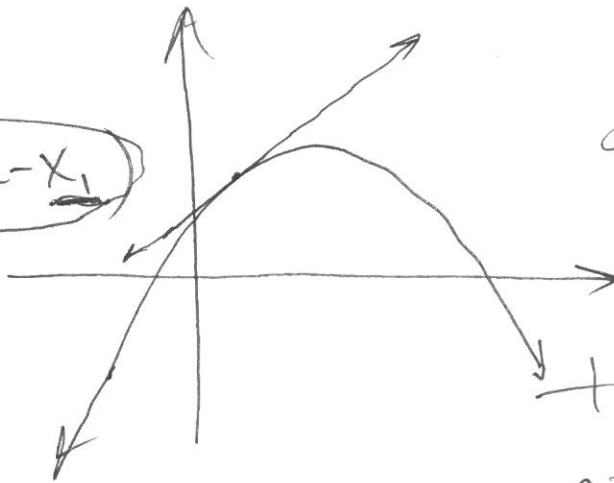
↑ dist; ht; pos.

lines:

$$y - \underline{y_1} = \underbrace{m}_{\text{slope}} (x - \underline{x_1})$$

slope

(x_1, y_1)



find the
Eq. of the
line tangent
to the curve
at $(1, 4)$

Instructor: John Griggs **TAs:** Chuan Xu (cxu9@ncsu.edu), Courtney Griggs (cgriggs@ncsu.edu),
Deepika Chaudhry (dchaudh@ncsu.edu) **Office:** SAS 2107 **Phone:** 513-2291
E-mail: jrgriggs@ncsu.edu **Office hours:** 1:15 – 2:45 pm T Th, and by appointment
Textbook: Calculus and its Applications (11th ed.) by Bittinger, 2016, (\$150 new, \$90 used)

Goals and Objectives: Since MA121 is a course in the mathematical sciences category of the General Education Requirements, it will provide instruction and guidance that helps students to: (1) improve and refine the mathematical problem-solving abilities; and (2) develop the logical reasoning skills. Upon completion of this one-semester, terminal calculus course, students will be able to define, find, and apply the derivative and the integral as well as relate these new concepts to previously learned mathematics.

Grading: 60% Tests; 15% Homework/Quiz ; 25% Final exam; the +/- system will be used:
98 - 100 A+; 92-97 A; 90-91 A-; 88-89 B+; 82-87 B; 80-81 B-; 78-79 C+; 72-77 C;
70-71 C-; 68-69 D+; 62-67 D; 60-61 D-; 0-59 F

Absences: No penalty for excessive absences; the reward for good attendance (3 absences or fewer) is replacing your worst test score with the final exam. (sleeping = absent) Tardies and early departures will accrue into absences (3T=1A). Students who are tardy should sit in the back row of the classroom so as not to distract the class that has already begun. It is then **your** responsibility to see the TA's at the front/back of the classroom after class to have your absence changed to a tardy. If an **excused** absence occurs on a test day, it is responsibility of the student to see the instructor as soon as possible to schedule a make-up test at a mutually agreeable time.

Homework/Quiz: 11 WebAssign homeworks; 4 quizzes (one of which is a one page type-written report of an interview with a person currently working in your chosen career/field. You may ask as many questions as you choose, but you **must** ask how mathematics is used in that career). This paper will be due after Fall Break (Oct 8). No late homework assignments will be accepted and **no make-up quizzes** will be given. As a result of this somewhat restrictive policy, the 3 worst grades from this group of 15 grades will be dropped. Requests for extension of webassign homework deadlines can be made using webassign – although point totals are reduced. (quizzes will be take-home; due the next class meeting)

All tests will be taken in blue books. Students should turn in 6 blue books (no names on them) to the TA's prior to test one. Blue books can be obtained at the student bookstores – many times they are free; they are at most \$.15 each. A stamped-blue book (two blue books for the exam) will be issued to you each test day. Students with **documented disabilities** (through NCSU's DSO) will be given all necessary accommodations. Instructor must have paperwork well before testing begins.

Academic Integrity Statement: Academic dishonesty includes the giving; taking, or presenting of information or material by a student with the intent of unethically or fraudulently aiding oneself or another person on any work which is to be considered in the determination of a grade or the completion of academic requirements. More specific definitions are set in the NCSU Code of Student Conduct. The honor pledge: "I have neither given nor received unauthorized aid on this test or assignment."

Final Exam: Monday, December 10, 1:00 – 4:00 pm, SAS2203

J. Griggs' homepage (link to class notes and test solutions): <http://www4.ncsu.edu/~jrgriggs/>

Webassign homepage: <http://webassign.ncsu.edu>

MA 121 - ELEMENTS OF CALCULUS
TEXT: Calculus, by M. L. Bittinger (11th Edition)

Fall 2018 (Monday/Wednesday Section)

Wednesday, August 22 – Wednesday, September 12:
Chapter R: R.1 – R.5; Chapter 1: 1.1 – 1.6; test review
Test #1: Monday, September 17

Wednesday, September 19 – Monday, October 8:
Chapter 1: 1.7, 1.8; Chapter 2: 2.1 – 2.5; test review
Test #2: Wednesday, October 10

Monday, October 15 – Wednesday, October 31:
Chapter 3: 3.1 – 3.5; Chapter 4: 4.1 – 4.3; test review
Test #3: Monday, November 5

Wednesday, November 7 – Monday, November 26
Chapter 4: 4.4 – 4.5; Chapter 5: 5.1 – 5.3, 5.6, 5.7; test review
Test #4: Wednesday, November 28

Monday, December 3 – Wednesday, December 5
Chapter 6: 6.1 – 6.3; final exam review
Comprehensive Final Exam: Monday, December 10 1:00 – 4:00