MA141 - 012

Wednesday, September 5

$f(x) = \sin x$ per: 2π

ampl: 1

Domain: $\mathbb{R}$

Range: $[-1, 1]$

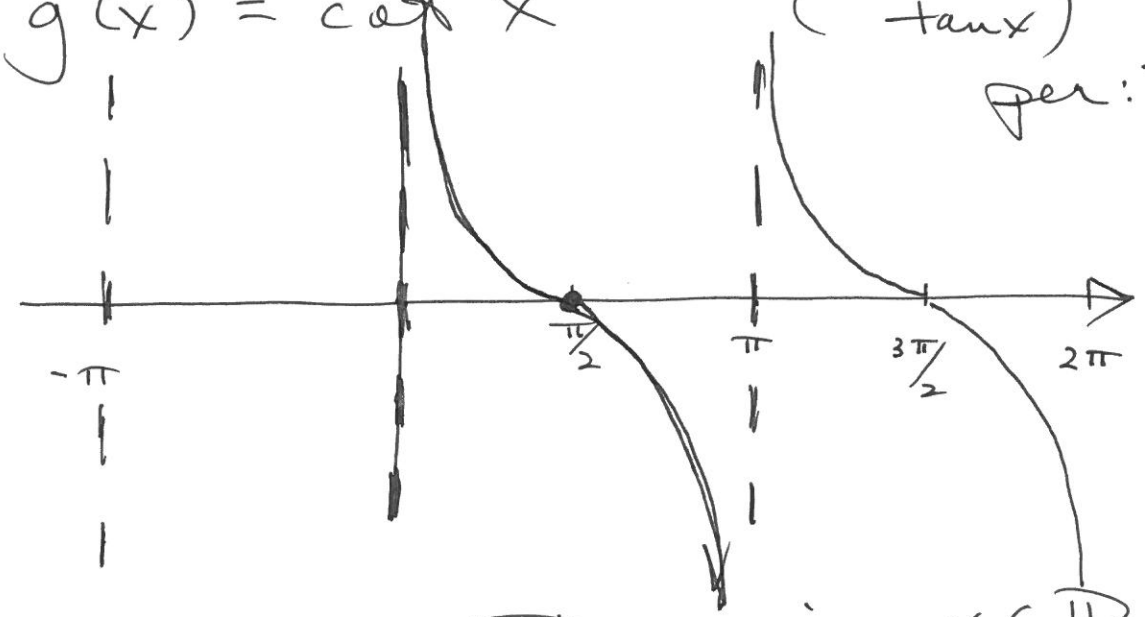
$\sin 7$;

$g(x) = 3\sin 4x$

per: $\frac{1}{4}(2\pi) = \frac{2\pi}{4} = \pi/2$

$g(x) = \cot x$ $\left(\frac{1}{\tan x}\right)$

per: π



Domain: $x \in \mathbb{R}$, except $0 + \pi \cdot n = \pi \cdot n$ $(n \in \mathbb{Z})$

Range: $\mathbb{R}$

INVERSE:

① interchange x & y

② solve for y

$y = x^3 = f(x)$

INV: find $f^{-1}(x)$: ← Inverse of $f(x)$

$x = y^3$

$\sqrt[3]{x} = y = f^{-1}(x)$

$\boxed{f(x) = \ln x}$

find $f^{-1}(x)$:

$y = \ln x$

INV:

$\boxed{x = \ln_e y}$

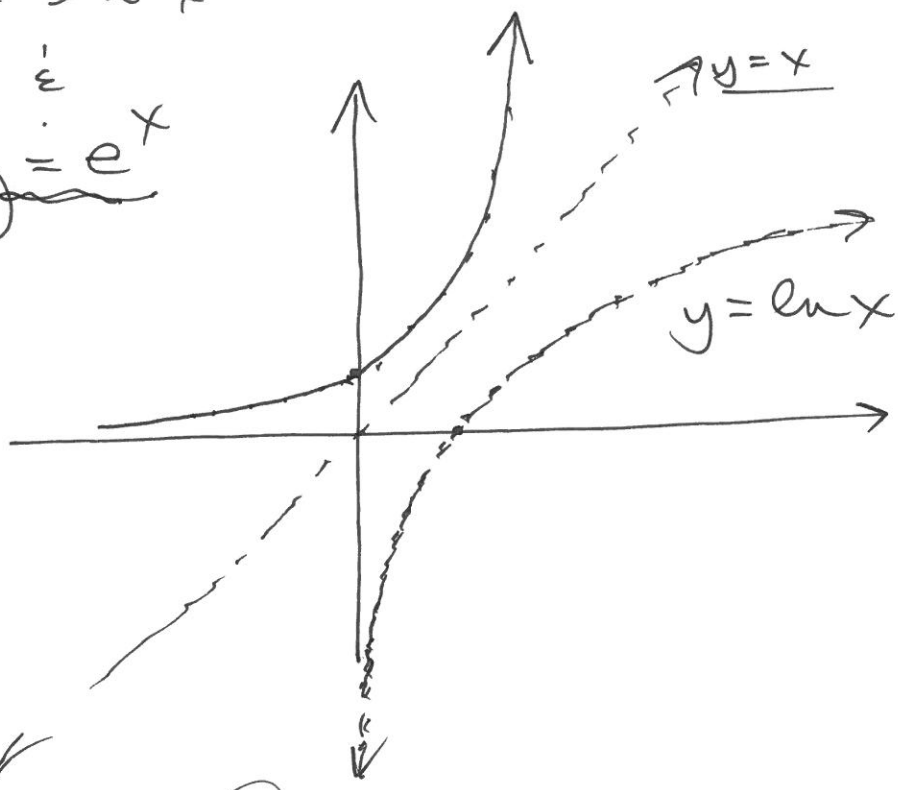
rewrite in exponential form:

$e^x = y = \boxed{f^{-1}(x) = e^x}$

$y = \ln x$

$\Updownarrow$

$y = e^x$



$\rightarrow f(f^{-1}(x)) = x$

$f^{-1}(f(x)) = x$

$f : \{ (1, 8) \ldots \}$

$f^{-1} : \{ (8, 1) \ldots \}$

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

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

$$(f \circ g)(x) = f(g(x))$$

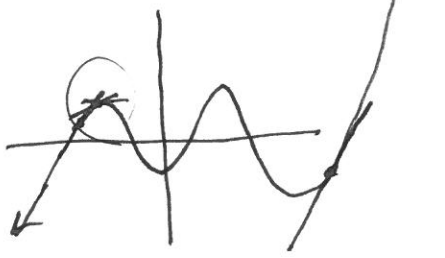
$$= f\left(\frac{3}{1-x}\right)$$

$$(f \circ g)(x) = 3\left(\frac{3}{1-x}\right)^2 - 4\left(\frac{3}{1-x}\right) + 2$$

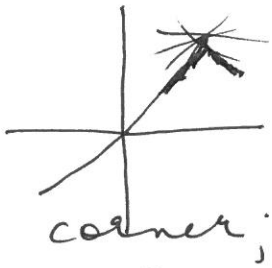
$$f(x) = 11x^8 - 5x^4 + 3x - 14x^0$$

polynomials:

1. continuous
2. "smooth"



not smooth



corner; cusp;

roots of quadratic eq:

$r_1 = 3+4i$ $\quad r_2 = 3-4i$

$$(x-(3+4i))(x-(3-4i)) = 0$$

$$(x-3-4i)(x-3+4i) = 0$$

$(a-b)(a+b)$

$a^2 - b^2$

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

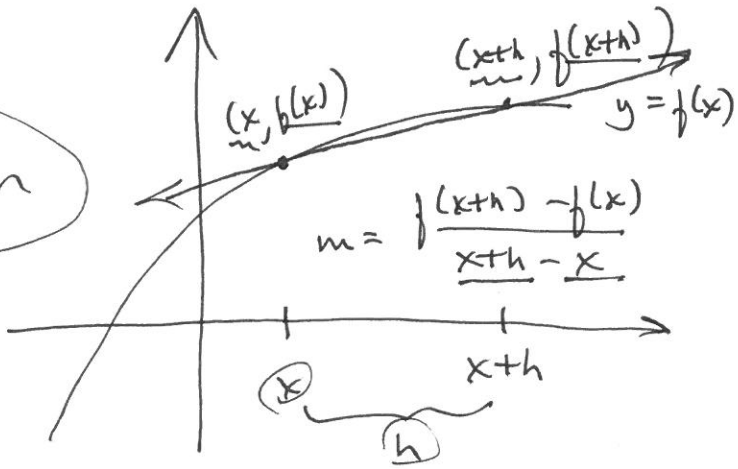
$$x^2 - 6x + 9 + (16) = 0$$

$$x^2 - 6x + 25 = 0$$

$$f(x) = \frac{3}{x+4}$$

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

DIFFERENCE QUOTIENT



$$f(x) = \frac{3}{x+4}$$

$$\frac{f(x+h) - f(x)}{h} = \frac{\left(\frac{3}{x+h+4} - \frac{3}{x+4}\right)}{h}$$

$$\left[\frac{3(x+4)}{(x+h+4)(x+4)} - \frac{3(x+h+4)}{(x+4)(x+h+4)}\right] \cdot \frac{1}{h}$$

$$= \frac{3(x+4) - 3(x+h+4)}{(x+h+4)(x+4) \cdot h}$$

$$= \frac{3x + 12 - 3x - 3h - 12}{(x+h+4)(x+4) \cdot h}$$

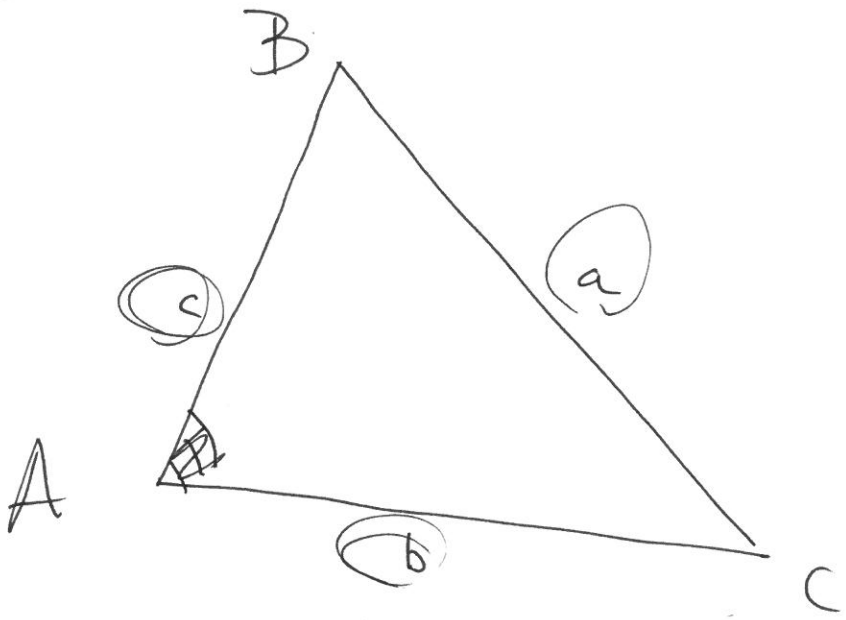
$$= \frac{-3h^{1}}{(x+h+4)(x+4) \cdot h_{1}} = \frac{-3}{(x+h+4)(x+4)} = m \quad (h \neq 0)$$

$$\frac{\sin^2\theta}{\cos^2\theta} + \frac{\cos^2\theta}{\cos^2\theta} = \frac{1}{\cos^2\theta}$$

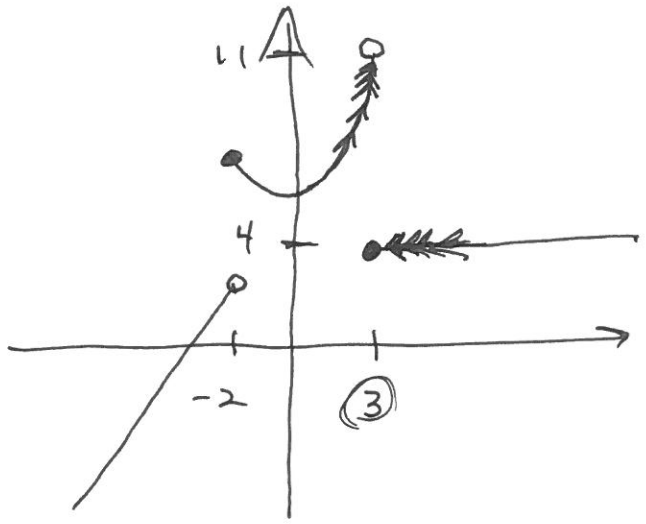
$$\tan^2\theta + 1 = \sec^2\theta$$

$$\frac{\sin^2\theta}{\sin^2\theta} + \frac{\cos^2\theta}{\sin^2\theta} = \frac{1}{\sin^2\theta}$$

$$1 + \cot^2\theta = \csc^2\theta$$



$$a^2 = b^2 + c^2 - 2 \cdot b \cdot c \cdot \cos A$$



(1) $\lim_{x \to 3^+} f(x) =$ 4 (from the right)

(2) $\lim_{x \to 3^-} f(x) =$ 11 (from the left)

$\lim_{x \to 3} f(x) =$ D.N.E.

(a) limit does not exist

$x = 3 + 6t$

$y = \sqrt{t}$

parameter: "t"

$t = y^2$

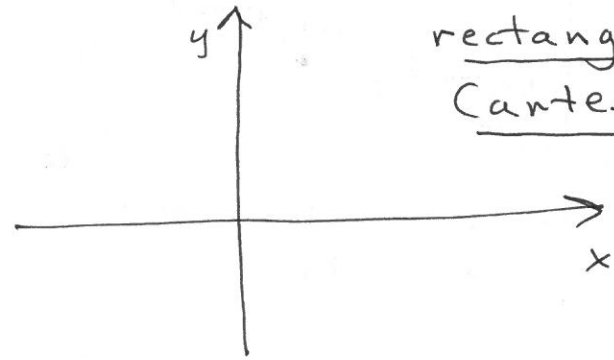
$(t \geq 0)$

t	0	1	2	
x	3	9		
y	0	1		

rectangular
Cartesian

equation in x & y only

$x = 3 + 6y^2$



$x = 3\cos t$ ellipse $y = 4\sin t$

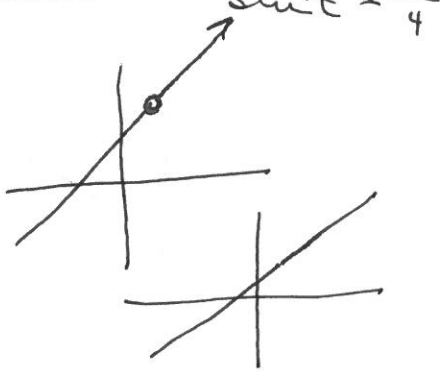
$\cos t = \frac{x}{3}$

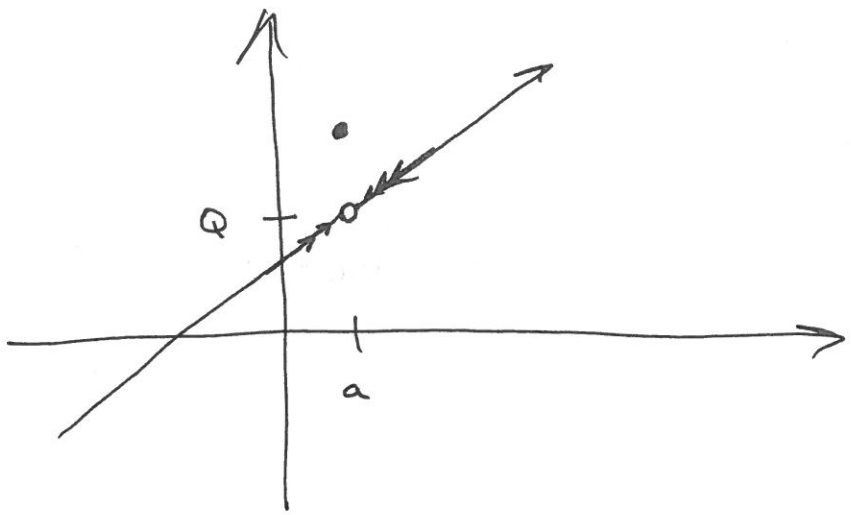
$\sin t = \frac{y}{4}$

$\sin^2 t + \cos^2 t = 1$

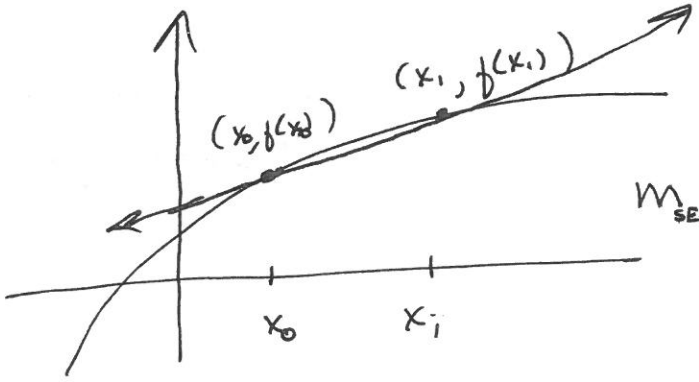
$\left(\frac{y}{4}\right)^2 + \left(\frac{x}{3}\right)^2 = 1$

$\frac{y^2}{16} + \frac{x^2}{9} = 1$ *





AVE. RATE OF CHANGE:

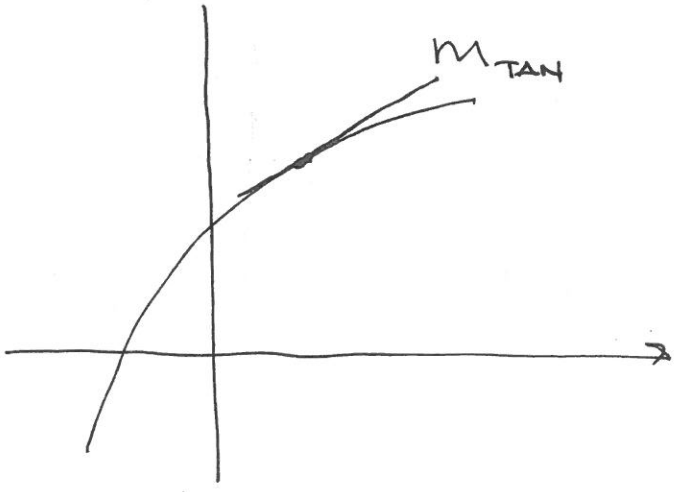


$$m_{SEC} = \frac{f(x_1) - f(x_0)}{x_1 - x_0}$$ ✓

2 pts → SECANT LINE

INSTANTANEOUS RATE OF CHANGE:

(2 points closer together ....)



$$m_{TAN} = \lim_{x_1 \to x_0} \frac{f(x_1) - f(x_0)}{x_1 - x_0}$$

141-012:

--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.

NC STATE FOOTBALL

FAITH & FAMILY DAY

SATURDAY, SEPTEMBER 8

VS. GEORGIA STATE

KICKOFF: 12:30 PM

CARTER-FINLEY STADIUM

11:30 @ P.N.C.

$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.