MA 141 – 005

Wednesday January 9

exponent rules:

$4^{-1} = \frac{1}{4^1}$ $\qquad$ $(a+b)^{-1} = \frac{1}{a+b}$

$4^{1/2} = \sqrt{4} = +2$ $\qquad$ $(x^2 = 4)$

$x = \pm 2$

$8^{2/3} = \left[\sqrt[3]{8}\right]^2 = \sqrt[3]{8^2}$

$5^2 = 5 \cdot 5 = 25$

$5^{2.1}$

$3^0 = 1$ $\qquad$ $\frac{3^4}{3^4} = 3^{4-4} = 3^0 = 1$

$0^0 = ??$

$\frac{0^4}{0^4} = \frac{0}{0} \rightarrow$ indeterminate form

$\lim_{x \to 0} \frac{23x}{10x} = \frac{0}{0} = ? = 2.3$

$\frac{\infty}{\infty}$

$x \neq 0$

x	.1	.01	.0001	.00000001	.000000000001

$(a^2 - b^2) = (a+b)(a-b)$

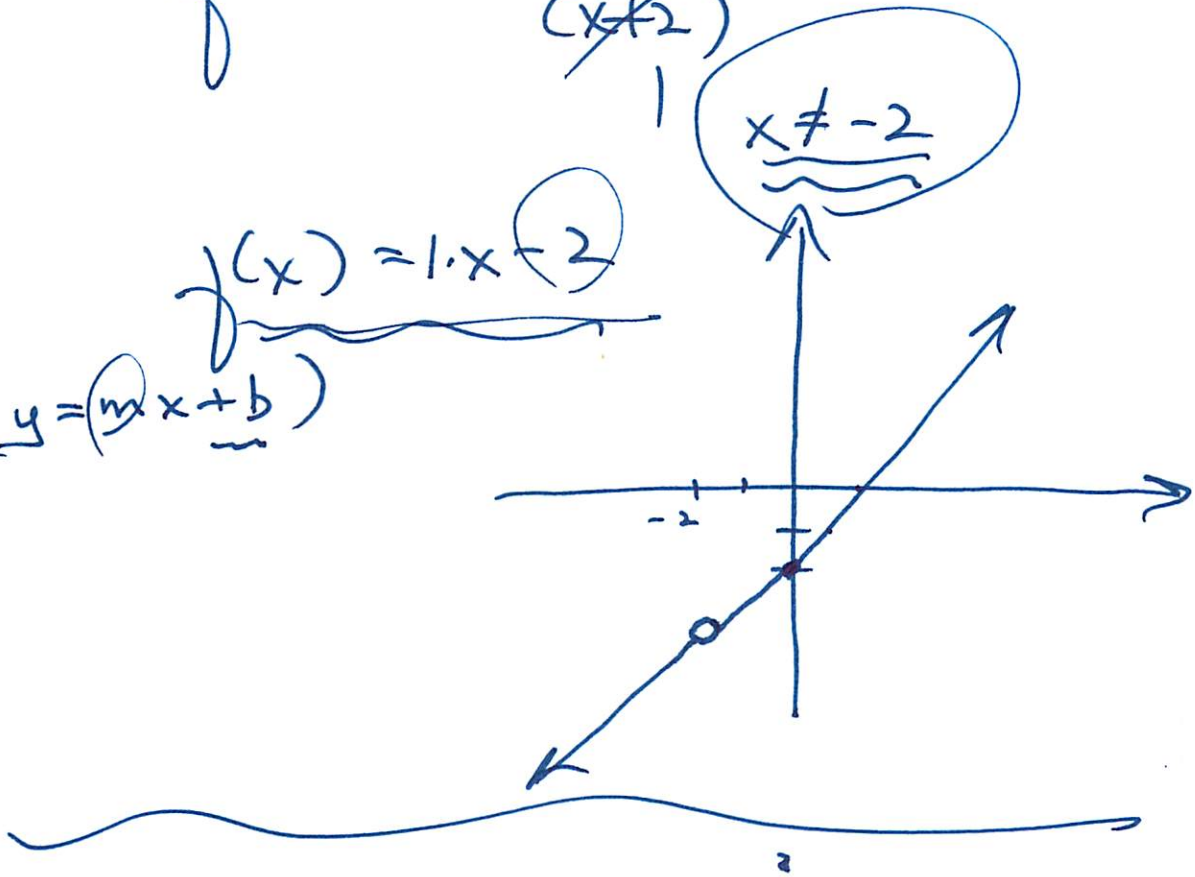
ex: $f(x) = \dfrac{x^2-4}{x+2}$ ← $x = -2$

$f(x) = \dfrac{(x-2)(x+2)}{(x+2)}$

$x \neq -2$

$f(x) = 1 \cdot x - 2$

$(y = mx + b)$



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

$\frac{0}{5} = 0$ (check: $0 \cdot 5 \stackrel{?}{=} 0$)

$\frac{4}{0} \neq \alpha$ (check: $\alpha \cdot 0 \stackrel{??}{=} 4$) no sol

$\frac{0}{0} = +314$ (check: $-3 \cdot 0 \stackrel{?}{=} 0$) inf. no. of sol.

$-31 \cdot 0 = 0$

$(314) \cdot (0) =$

$y = \sin x$

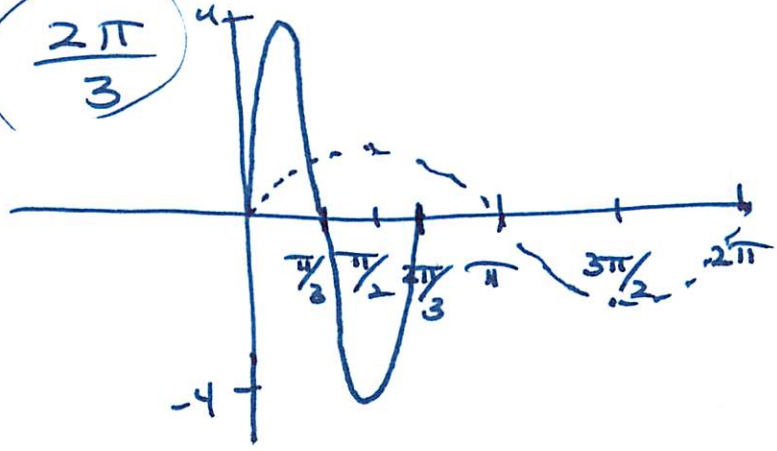
period: per $= 2\pi$

ampl: 1

$y = \underline{4} \sin 3x$

ampl: 4

per: $\frac{2\pi}{3}$



$y = 4 \sin 3(x + \pi/6)$

left $\pi/6$

logs & exponents:

LOG = EXPONENT

$5^x = 28.6$

$x = \log_5 28.6$

$e^x = 108.9$ $\quad (e \approx 2.718)$

$$\lim_{x \to \infty} \left(1 + \frac{1}{x}\right)^x = e \quad 1^\infty$$

$x = 100$

$\left(1 + \frac{1}{100}\right)^{100} \Rightarrow 2.7$

$x = 10{,}000$

$\left(1 + \frac{1}{10{,}000}\right)^{10{,}000} \Rightarrow 2.718$

$x = 100{,}000{,}000$

$\left(1 + \frac{1}{100{,}000{,}000}\right)^{100{,}000{,}000} \Rightarrow 2.718$

$x = \log_e 108.9$

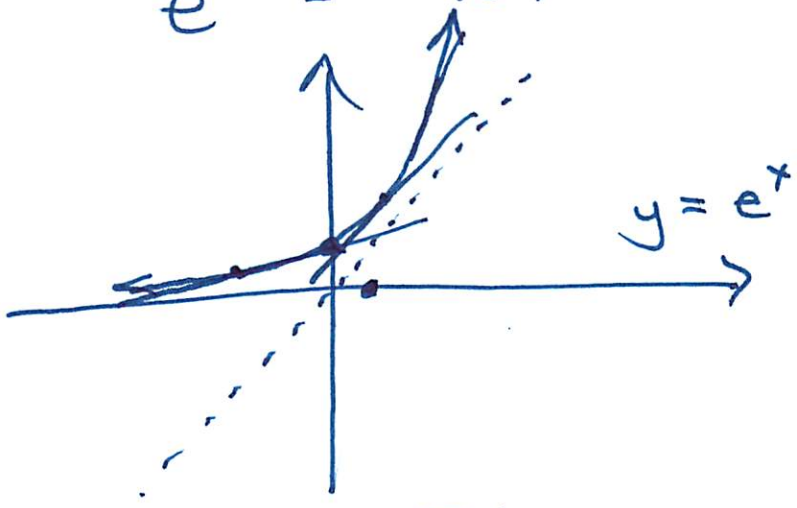
$x = \ln 108.9$ $\quad (\ln 108.9 \approx 4.69)$

$e^{4.69} = 108.9$

$\ln(e^2) = 2$

$\ln(-127) =$

$e^{??} = -127$



INVERSE:

$y = e^x$

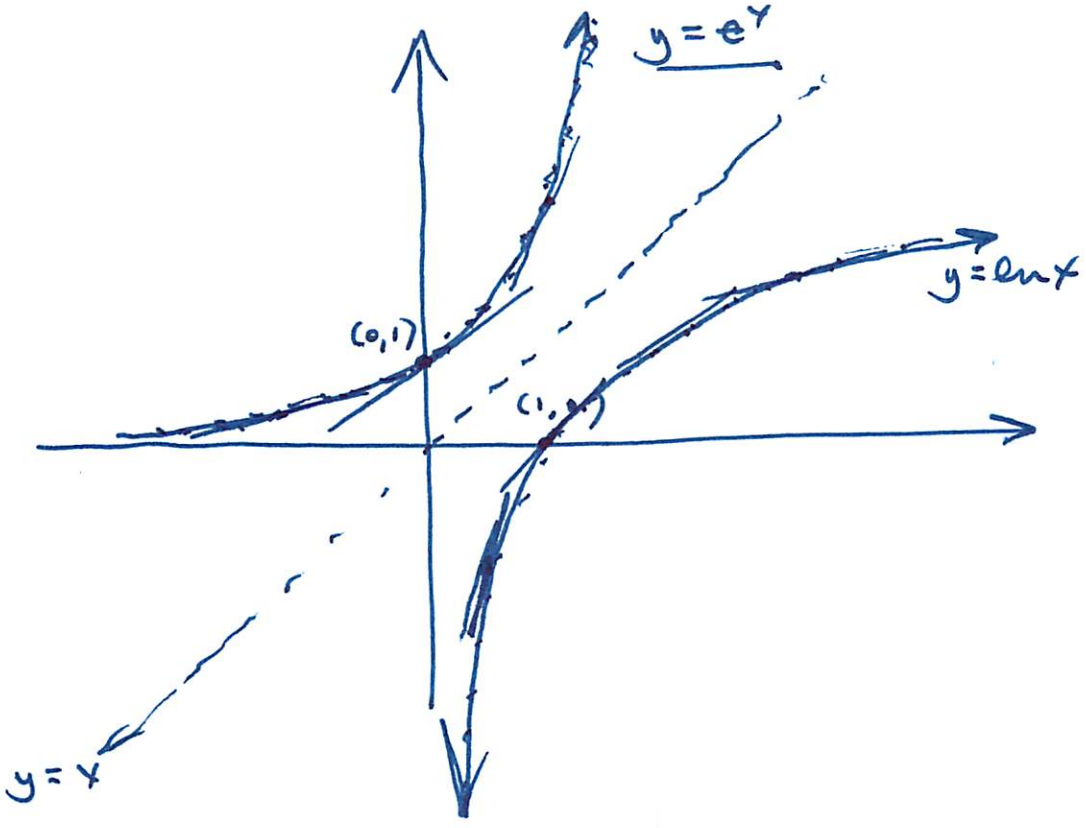
INV:
① init. x & y
② solve for y

INV: ① $x = e^y$

② solve for y:

$y = \log_e x$

$y = \ln x$



$|x-4| < 2$

① $x-4 < 2$

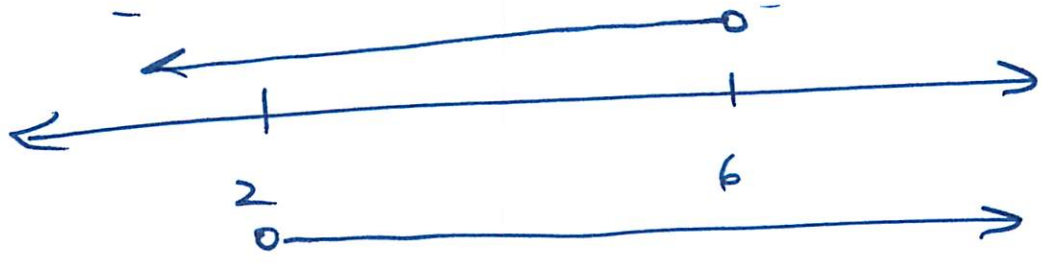
② $x-4 > -2$

① $x-4<2$

$x<6$

② $x-4>-2$

$x>2$

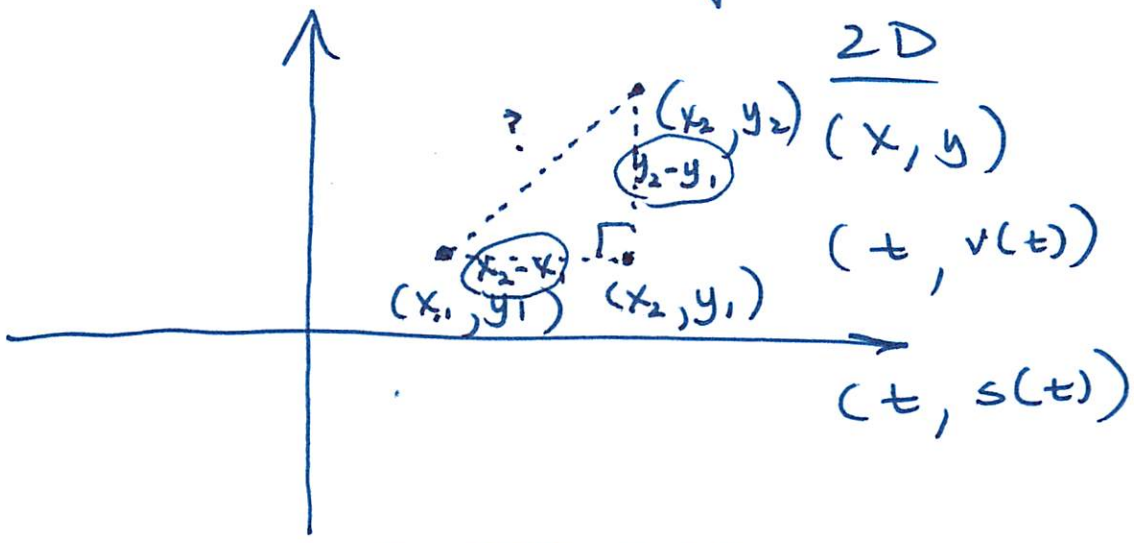


$2<x<6$

interval notation:

$(2, 6)$

Cartesian coord. plane:

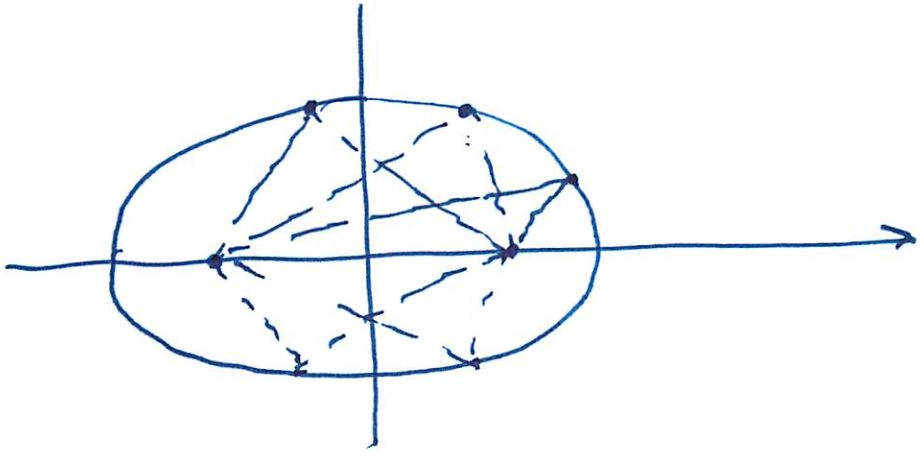


DISTANCE FORMULA:

$$(?)^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

$$(?) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

CONIC SECTIONS:



$$\sqrt{(x-c)^2 + y^2} + \sqrt{(x+c)^2 + y^2} = 2a$$

$$\left[\sqrt{(x-c)^2 + y^2}\right]^2 = \left[2a - \sqrt{(x+c)^2 + y^2}\right]^2$$

$$(x-c)^2 + y^2 = 4a^2 - 4a\sqrt{(x+c)^2 + y^2} + (x+c)^2 + y^2$$

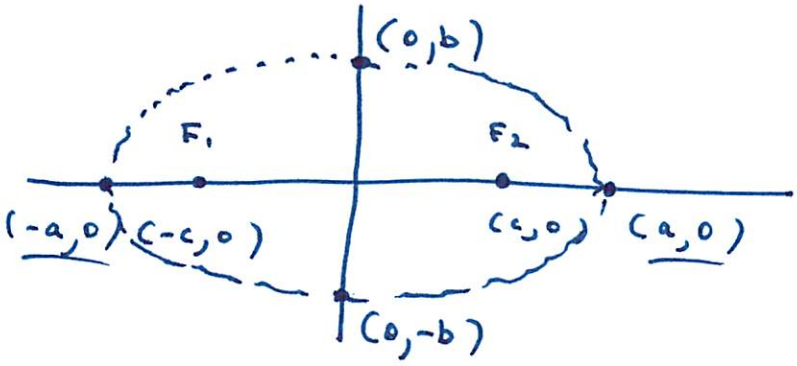
$$\vdots$$

$(0,-b)$

$x=0$ $(0,b)$

$(-a,0)$

$y=0$ $(a,0)$



$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$$

$(a^2=b^2+c^2)$