Sheet #361: NAME: KEY Period: 12/10/06

INVERSES AND CONIC SECTIONS: A REFRESHER

A. INVERSES (See book: p. 20, p. 24, p. 33) (1.3, 1.4, 1.5)

If f and g are inverses

$f(g(x)) = g(f(x)) = x$ (identity function)

or...

$f^{-1}(y) = x$ means $y = f(x)$.

- **Question 1.** FIND INVERSE FUNCTIONS FOR

a) $f(x) = e^{2x} + 1$ $\quad y = e^{2x}+1 \leftrightarrow x = e^{2y}+1 \rightarrow x-1 = e^{2y} \rightarrow 2y = \ln(x-1)$

b) $g(x) = 2\ln(x)$ $\quad y = 2\ln(x) \leftrightarrow x = 2\ln(y) \rightarrow \frac{x}{2} = \ln y \rightarrow \boxed{y = e^{x/2}}$ $\quad \boxed{y = \frac{\ln(x-1)}{2}}$

c) $s(x) = \cos(x - \pi/6)$ $\quad y = \cos(x-\pi/6) \leftrightarrow x = \cos(y-\pi/6)$

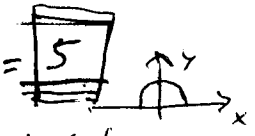
$\cos^{-1}(x) = y - \pi/6$ $\quad \boxed{y = \cos^{-1}(x) + \pi/6}$

B. CONIC SECTIONS: circles, ellipses (parabolas, hyperbolas)

$Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$

(Bxy: ← ROTATIONS.)

- **Question 2.** a) Find the radius of the circle $x^2 + y^2 = 25$. $r = \boxed{5}$



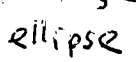
b) Make a sketch of it, below.

c) What is $y = \sqrt{25 - x^2}$? $\boxed{\text{upper}}$ semicircle (a function for $y \geq 0$)

- **Question 3.** a) Find the values for the semimajor & semiminor axes of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$. $\begin{cases} a = \boxed{5} \\ b = \boxed{3} \end{cases}$

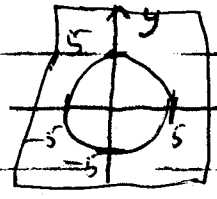
b) Make a sketch of it, to right

c) What is $y = 3\sqrt{1 - x^2/25}$?



$\boxed{\text{upper}}$ "semi" ellipse (a function for $y \geq 0$, $-5 < x < 5$)

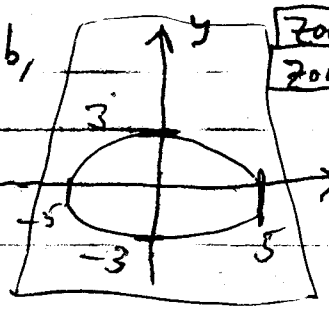
2b)



Zoom 6. ($-5 < x < 5$)

Zoom 5.

3b)



Zoom 6

Zoom 5