AP Calculus BC
Unit 11 – Day 1 – Assignment

Name: Answer Key*

#'s 1 – 3: Sketch the curve (by hand) represented by the parametric equations and write the corresponding rectangular equation by eliminating the parameter.

1) $x = \sqrt{t}, y = t - 2$

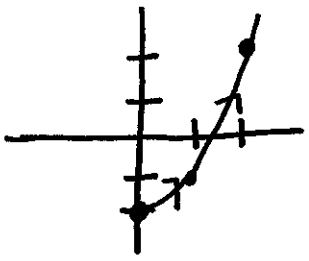
$y + 2 = t$

$x = \sqrt{y+2}$

$x^2 = y + 2$

$y = x^2 - 2$

t	0	1	2	3	4
x	0	1	$\sqrt{2}$	$\sqrt{3}$	2
y	-2	-1	0	1	2

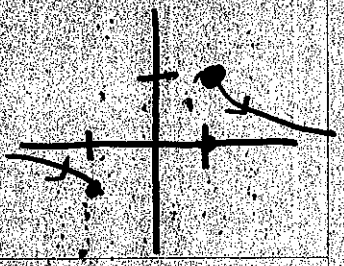


2) $x = sec\theta, \quad y = cos\theta$

$sec\theta \cdot cos\theta = 1 \rightarrow xy = 1$

$y = \frac{1}{x}$

t	0	$\frac{\pi}{2}$	π
x	1	und.	-1
y	1	0	-1



3) Circle

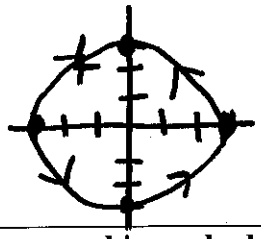
$x = 3cos\theta, \quad y = 3sin\theta$

$\frac{x}{3} = cos\theta \quad \frac{y}{3} = sin\theta$

$\left(\frac{x}{3}\right)^2 + \left(\frac{y}{3}\right)^2 = 1 \rightarrow \frac{x^2}{9} + \frac{y^2}{9} = 1$

$x^2 + y^2 = 9$

t	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$
x	3	0	-3	0
y	0	3	0	-3



#'s 4 – 6: Use your graphing calculator to sketch the curve represented by the parametric equations. Eliminate the parameter and write the corresponding rectangular equation.

4) Ellipse

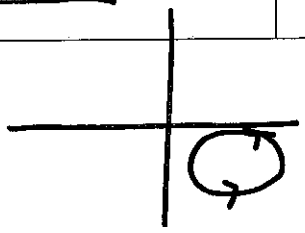
$x = 4 + 2cos\theta$

$y = -1 + sin\theta$

$\frac{x-4}{2} = cos\theta \quad \frac{y+1}{1} = sin\theta$

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

$\frac{(x-4)^2}{4} + \frac{(y+1)^2}{1} = 1$

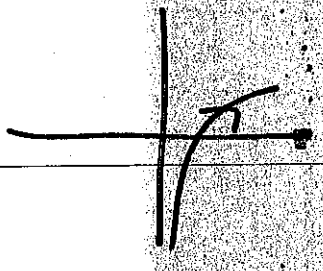


5) $x = t^3, y = 3lnt$

$t = \sqrt[3]{x} \rightarrow y = 3ln(\sqrt[3]{x})$

$y = ln(\sqrt[3]{x})^3$

$y = lnx$



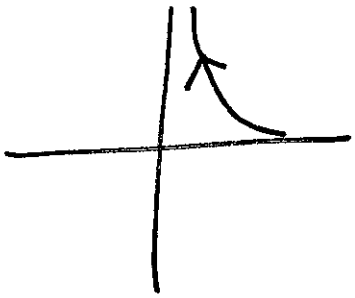
6)

$x = e^{-t}, y = e^{3t}$

$\frac{1}{x} = e^t \qquad \sqrt[3]{y} = e^t$

$\frac{1}{x} = \sqrt[3]{y}$

$y = \frac{1}{x^3}$



#'s 7 – 8: Find a set of parametric equations for the conic.

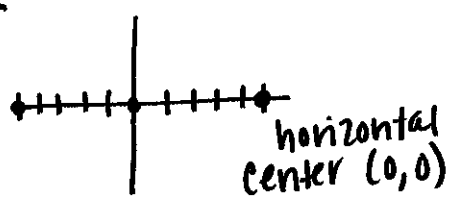
7) *Ellipse:* Vertices $(\pm 5, 0)$, *Foci* $(\pm 4, 0)$

$a = 5 \qquad c = 4$

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

$5^2 = b^2 + 4^2$

$b = 3$



$\frac{x^2}{25} + \frac{y^2}{9} = 1$

$\frac{x}{5} = \cos\theta \qquad \frac{y}{3} = \sin\theta$

$x = 5\cos\theta \qquad y = 3\sin\theta$

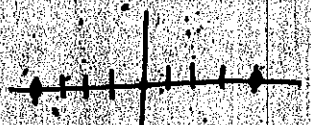
8) *Hyperbola:* Vertices $(\pm 4, 0)$, *Foci* $(\pm 5, 0)$

$a = 4 \qquad c = 5$

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

$5^2 = 4^2 + b^2$

$b = 3$



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

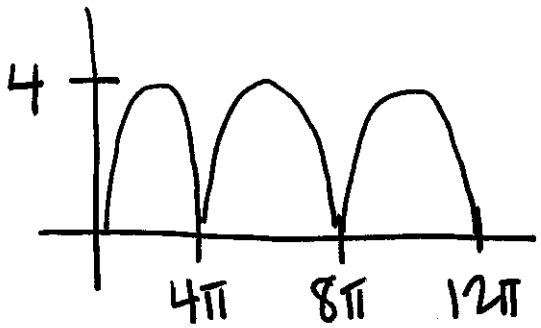
$\frac{x}{4} = \sec\theta \qquad \frac{y}{3} = \tan\theta$

$x = 4\sec\theta \qquad y = 3\tan\theta$

9) Graph the cycloid $x = 2(\theta - \sin\theta)$, $y = 2(1 - \cos\theta)$. Identify any points at which the curve is not smooth.

$a = 2$

$2\pi n a = 2\pi n(2) = 4\pi n$



not smooth = $2\pi n$