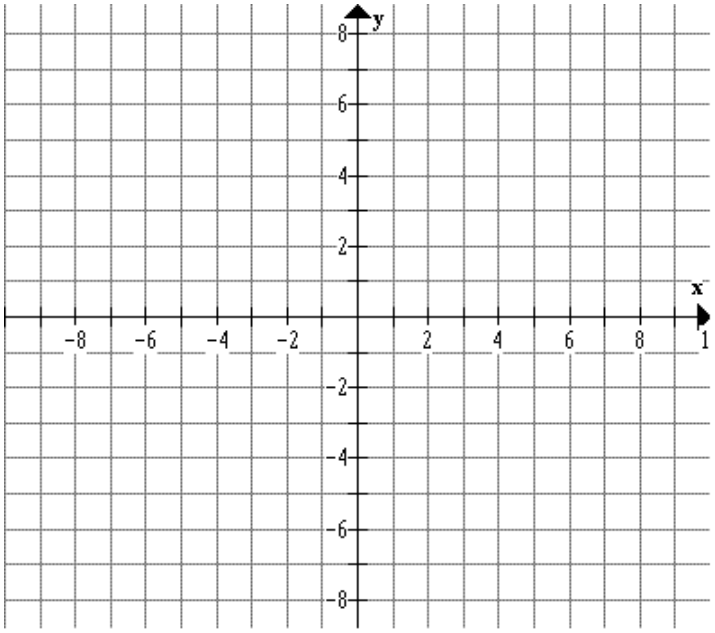
Calculus II 804-232 Exam 4a Fall 2005 /100

Name _____ **Each problem is worth 25 points.**

1. Given the parametric equations: $x = 2\sin(t) + 1$ and $y = -3\cos(t) - 3$: a) Sketch the curve for $0 \le t < 2\pi$

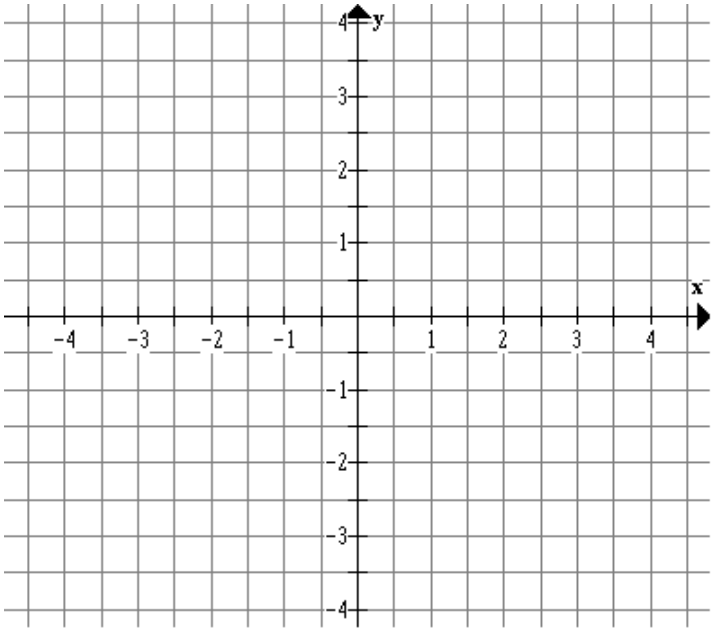


b) What is the value of $\frac{dy}{dx}$ at $(1+\sqrt{2},\ -3+\frac{3}{\sqrt{2}})$

c) Set up (but **don't** evaluate) the integral for the arc length of the curve from $(1,\ -6)$ to $(3,\ -3)$.

d) Calculate the eccentricity of this figure.

2. Sketch the polar curve : $r = 2\cos(2\theta) + 1$



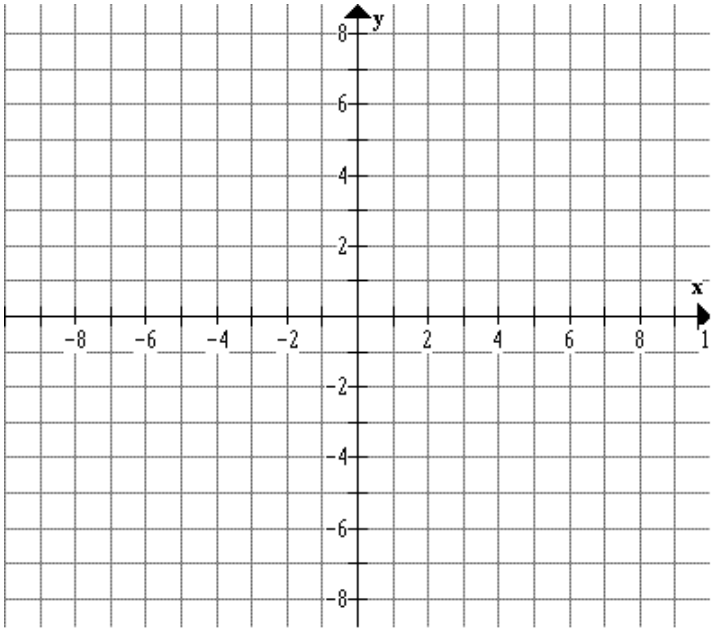
5 point Bonus Question: Set up **and evaluate** a definite integral which gives the area of the loop aligned along the positive y axis.

3.

For the following quadratic curve:

$$9y^2 - x^2 - 18y - 6x - 9 = 0$$

(1) Identify which conic section or degenerate case it represents.
(2) Calculate (if not a parabola) a , b and c .
(3) Calculate the eccentricity, e .
(4) Calculate the coordinates of all vertices and/or centers.
(5) Calculate the coordinates of all foci.
(6) Write the equation of the directrix.
(7) Sketch the curve, showing asymptotes if it is a hyperbola.



4.

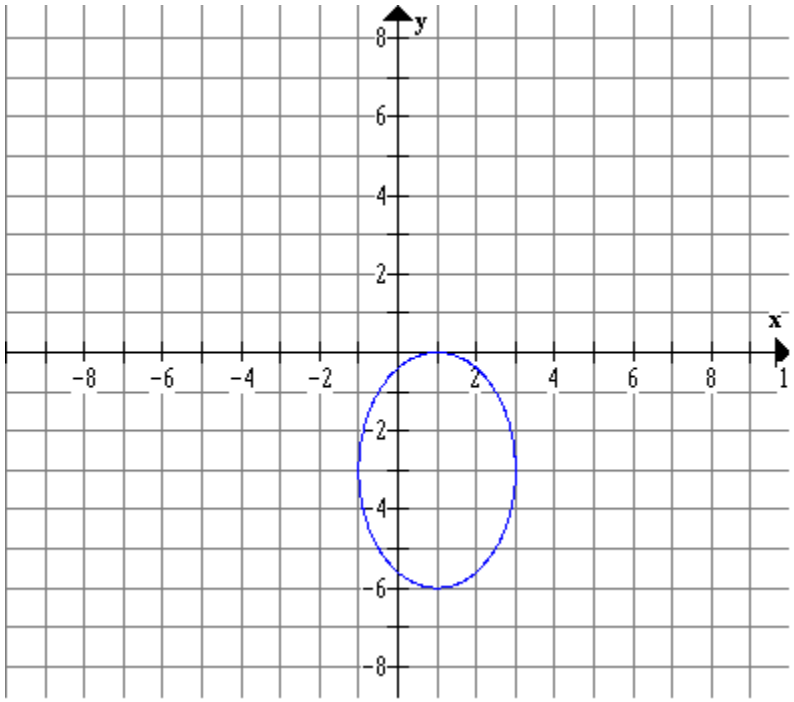
a) Write a Cartesian coordinate equation of a conic section having the given directrix, focus and eccentricity.

Focus : $(-3, 4)$ Directrix : $x = -5$ Eccentricity $= \frac{1}{2}$

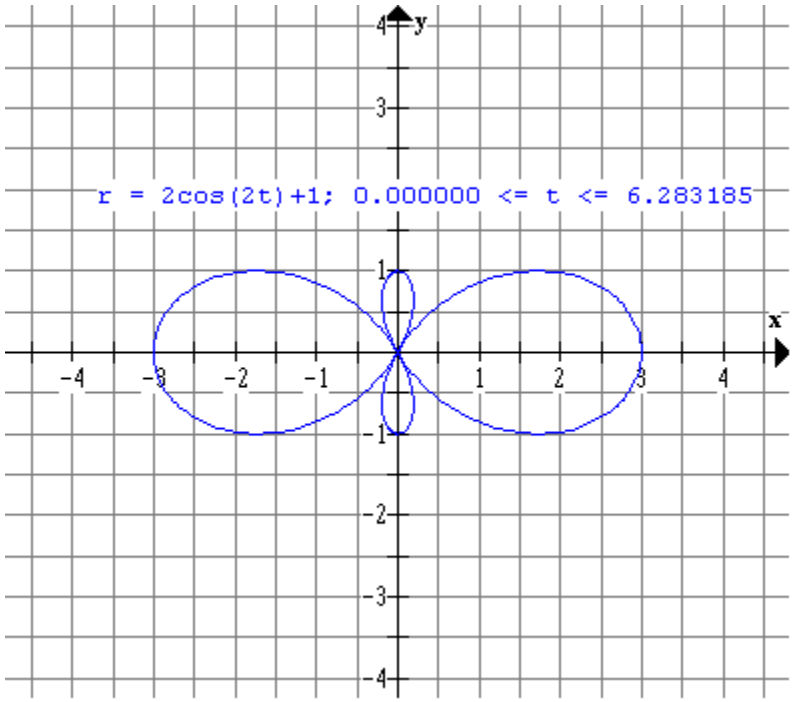
b) Find **a** Cartesian coordinate equation of $r = \frac{2}{3+\cos(\theta)}$

c) Find the polar equation of a conic section of eccentricity, $\epsilon = 4$, focus at the origin and directrix $y = 2$.

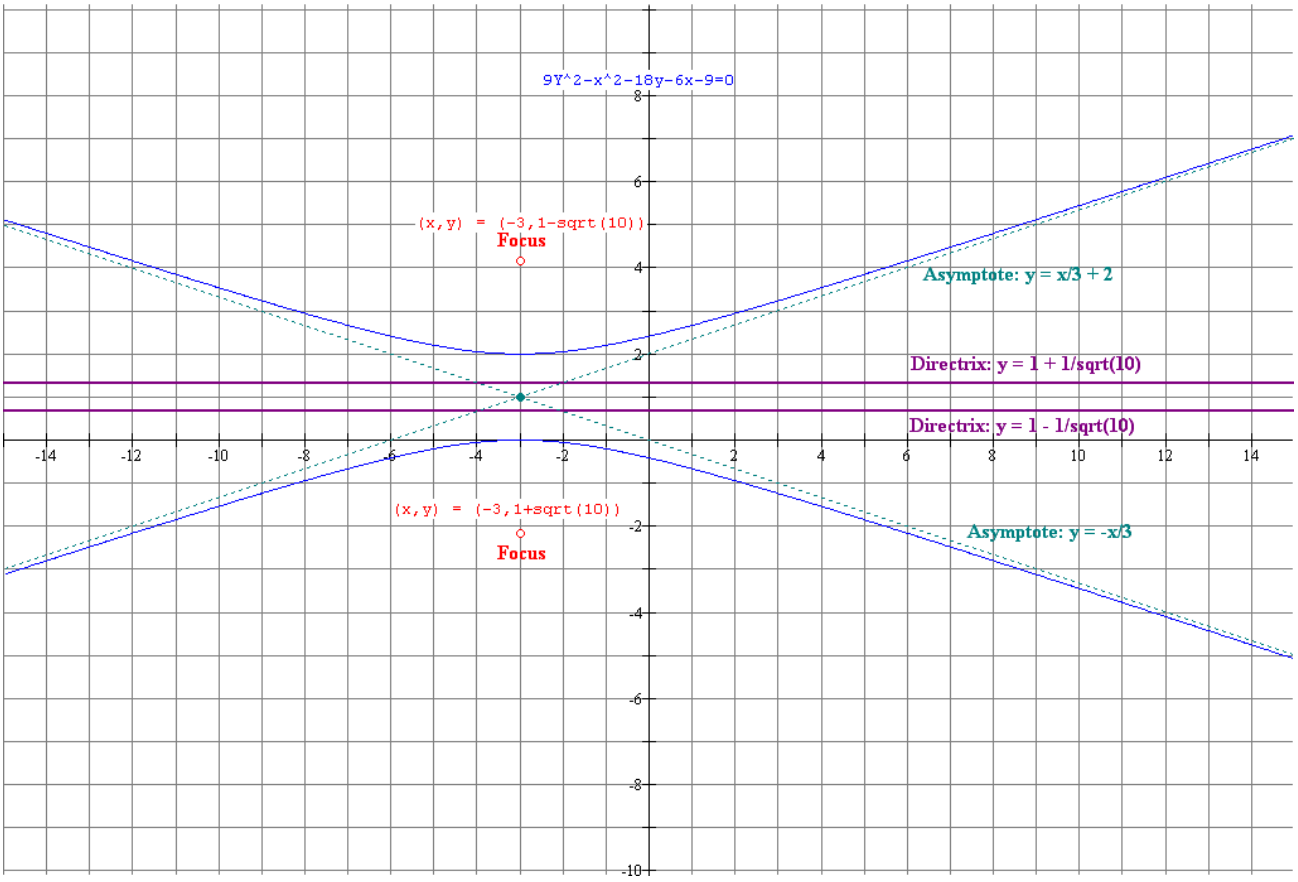
Problem 1



Problem 2



Problem 3



Problem 4a