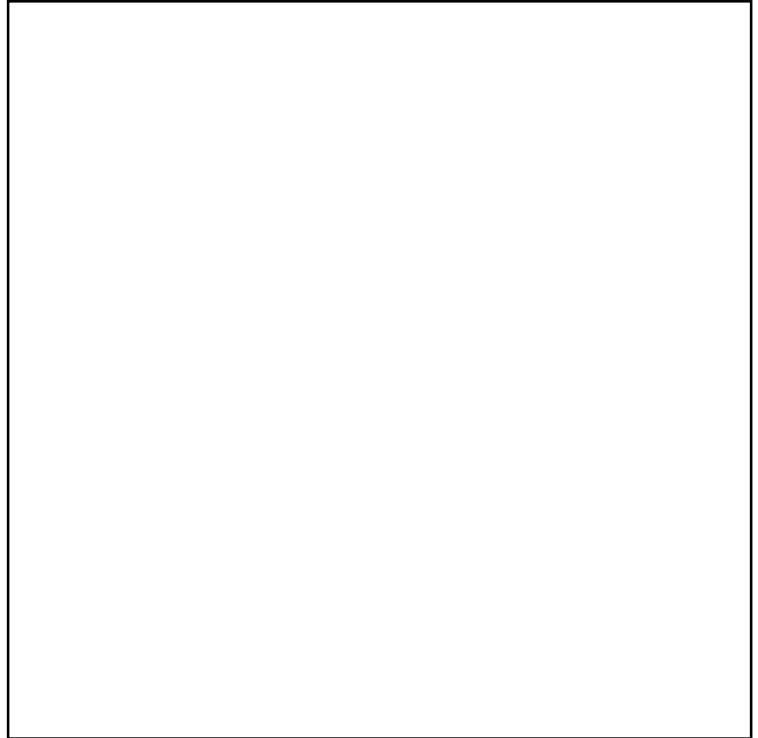


Use Algebraic Notation AND Show All of Your Work

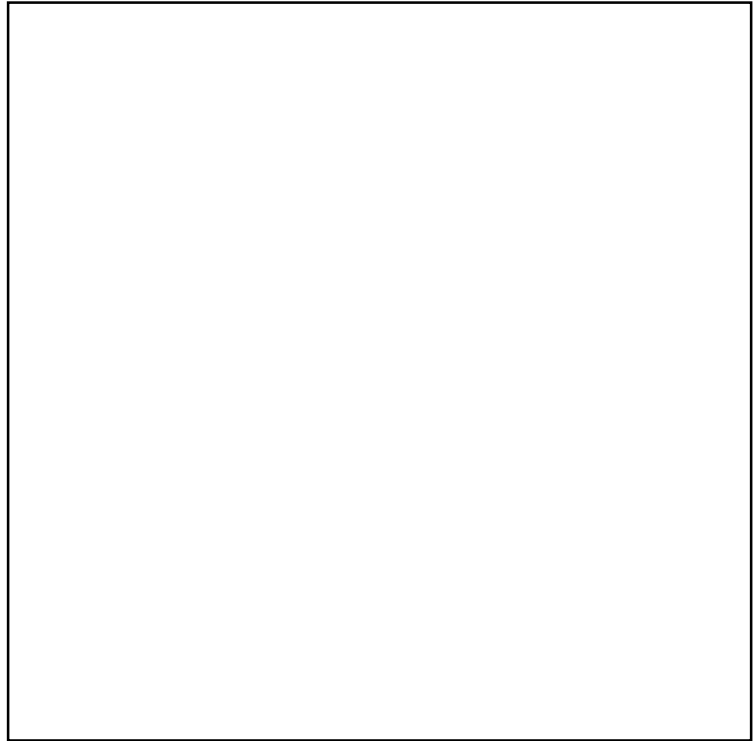
-
1. (a) Find the *STANDARD FORM* equation of the conic that has its vertex at $(-1, 2)$ and its focus at $(-1, 0)$. (b) Graph this conic. (c) Find the equation of the directrix. (d) **Label** the vertex, focus, and directrix on your graph. (*Be careful with your notation, and show your steps clearly.*)



(a) Standard Form of conic: _____

(c) equation of directrix : _____

2. (a) Find the *STANDARD FORM* equation of the conic that the following equation: $y^2 + 6y + 8x + 25 = 0$. (b) Graph this conic. (c) Find the vertex, focus, and directrix. (d) Label the vertex, focus, and directrix on your graph. (*Be careful with your notation, and show your steps clearly.*)

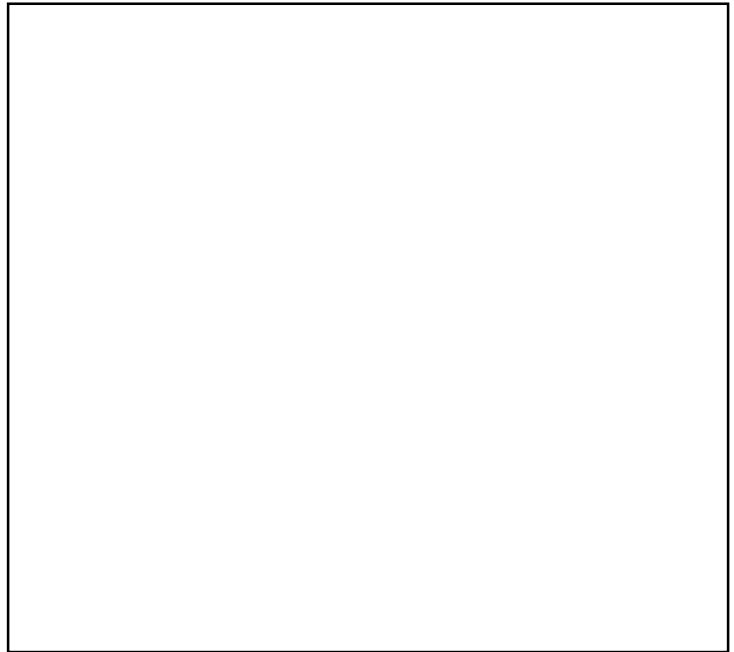


(a) Standard Form of conic: _____

(c) vertex : _____ focus : _____

(c) equation of directrix : _____

3. (a) Rewrite the equation of the conic $9x^2 + 4y^2 + 36x - 24y + 36 = 0$ in *STANDARD FORM*. (b) Sketch a graph of this conic. (c) Find the center, foci, and vertices. (d) Label the center, foci, and vertices on your graph. (*Be careful with your notation, and show your steps clearly.*)

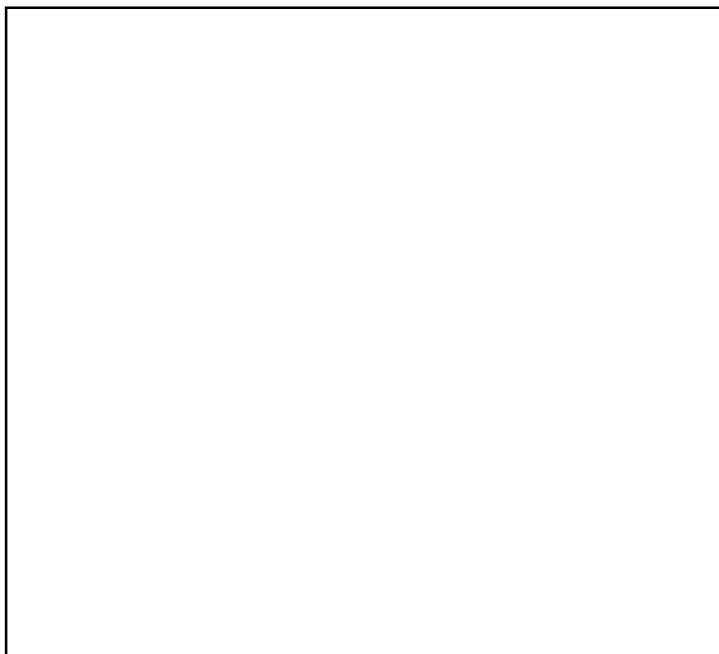


(a) Standard Form of conic: _____

(c) center : _____ foci : _____

vertices : _____

4. (a) Rewrite the equation of the conic $3x^2 - 2y^2 - 6x - 12y - 27 = 0$ in *STANDARD FORM*. (b) Sketch a graph of this conic. (c) Find the center, foci, vertices, and the equations of the asymptotes. (d) **Label** the center, foci, vertices, and the asymptotes on your graph. (*Be careful with your notation, and show your steps clearly.*)

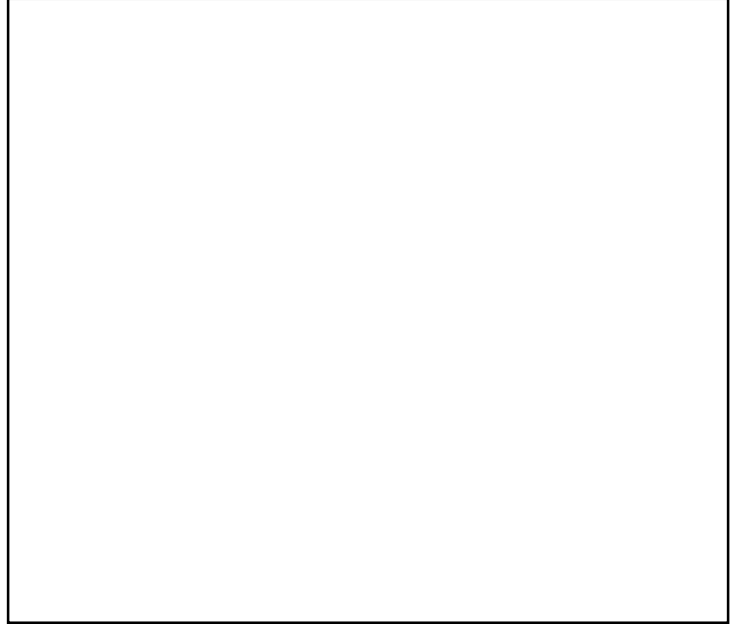


(a) Standard Form of conic: _____

(c) center : _____ foci : _____

vertices : _____ asymptotes: _____

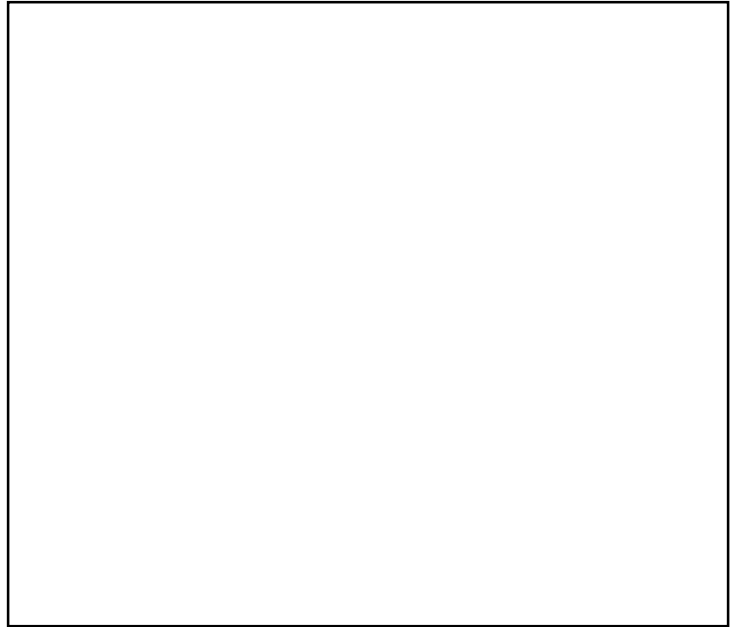
5. **(a)** Use a graphing utility to graph the curve represented by the following parametric equations: $\begin{cases} x = t^3 \\ y = \frac{1}{2}t^2 \end{cases}$. **(b)** Eliminate the parameter and write the corresponding rectangular equation. *(Be careful with your notation, show orientation arrows on your curve, and show your steps clearly.)*



6. (a) Use a graphing utility to graph the curve represented by the following parametric

equations: $\begin{cases} x = 4 + 2\cos(\theta) \\ y = -1 + 4\sin(\theta) \end{cases}$. (b) Eliminate the parameter and write the corresponding

rectangular equation in **STANDARD FORM**. (c) State the center and vertices. (d) **Label** the center and vertices on your graph. (*Be careful with your notation, show orientation arrows on your curve, and show your steps clearly.*)



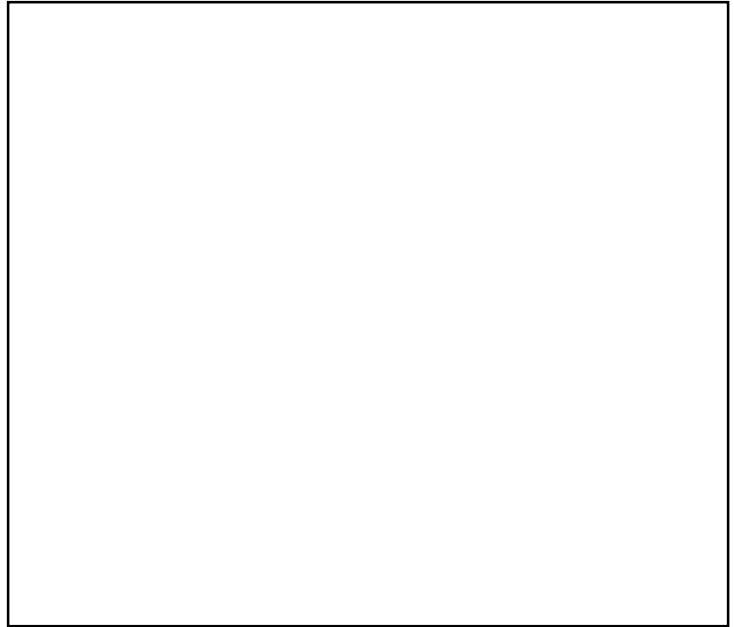
(b) Standard Form of conic: _____

(c) center : _____ vertices : _____

7. (a) Use a graphing utility to graph the curve represented by the following parametric

equations:
$$\begin{cases} x = 4 \sec(\theta) \\ y = 3 \tan(\theta) \end{cases}$$
 . (b) Eliminate the parameter and write the corresponding

rectangular equation in **STANDARD FORM**. (c) State the center and vertices. (d) **Label** the center and vertices on your graph. (*Be careful with your notation, show orientation arrows on your curve, and show your steps clearly.*)



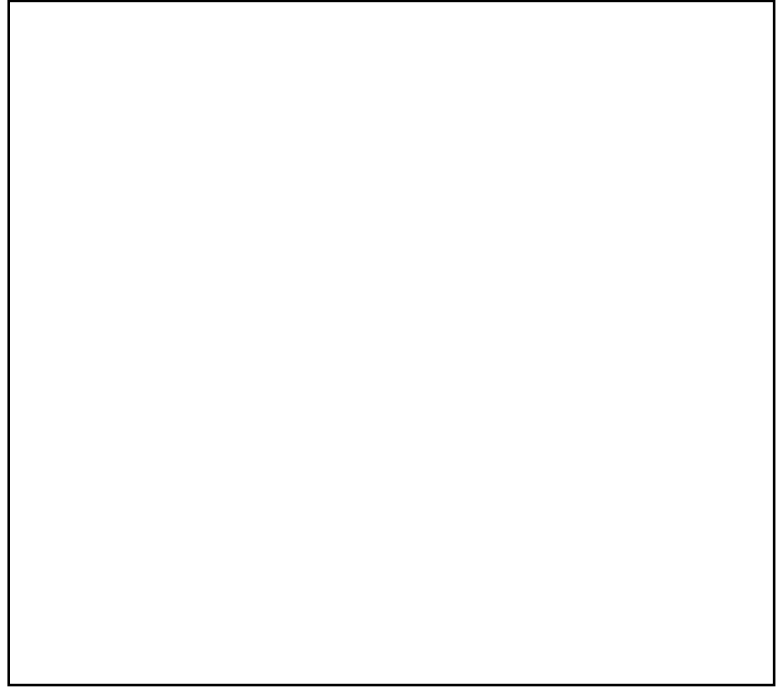
(b) Standard Form of conic: _____

(c) center : _____ vertices : _____

8. (a) Use a graphing utility to graph the curve represented by the following parametric

equations: $\begin{cases} x = t+1 \\ y = t^2 + 3t \end{cases}$. (b) Find $\frac{dy}{dx}$. (c) Find $\frac{d^2y}{dx^2}$. (d) Use $\frac{dy}{dx}$ to find slope of the

tangent line when $t = -1$. (e) Use $\frac{d^2y}{dx^2}$ to find the concavity of the curve when $t = -1$. (Be careful with your notation, show orientation arrows on your curve, use calculus to demonstrate your results, and show your steps clearly.)



(b) $\frac{dy}{dx} =$

(c) $\frac{d^2y}{dx^2} =$

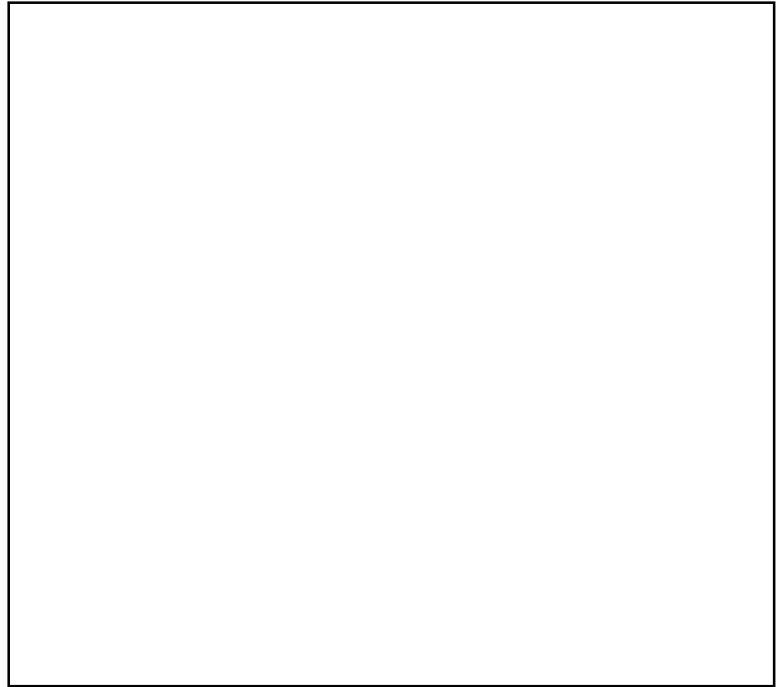
(d) slope of the tangent line when $t = -1$:

(e) concavity of the curve when $t = -1$:

9. (a) Use a graphing utility to graph the curve represented by the following parametric

equations: $\begin{cases} x = 2\cos(\theta) \\ y = 2\sin(\theta) \end{cases}$. (b) Find $\frac{dy}{dx}$. (c) Find $\frac{d^2y}{dx^2}$. (d) Use $\frac{dy}{dx}$ to find slope of the

tangent line when $t = \frac{\pi}{4}$. (e) Use $\frac{d^2y}{dx^2}$ to find the concavity of the curve when $t = \frac{\pi}{4}$. (Be careful with your notation, show orientation arrows on your curve, use calculus to demonstrate your results, and show your steps clearly.)



(b) $\frac{dy}{dx} =$

(c) $\frac{d^2y}{dx^2} =$

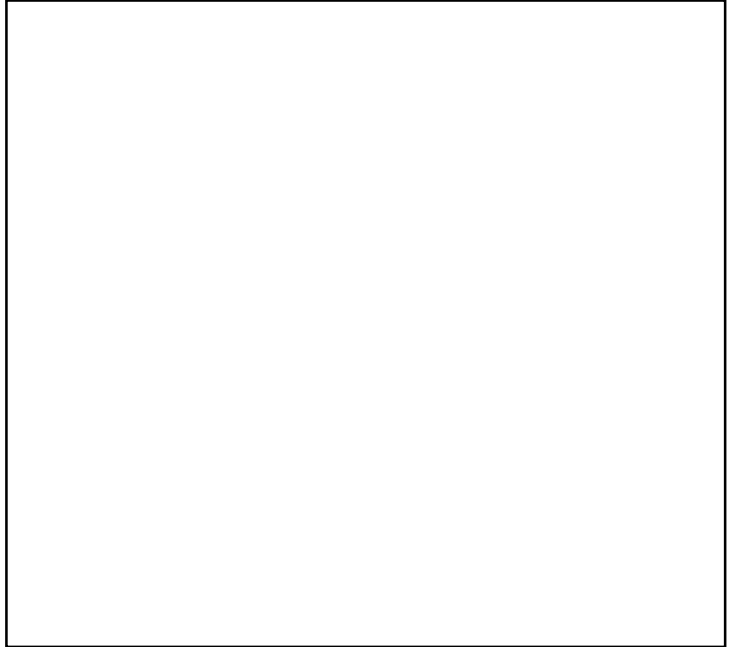
(d) slope of the tangent line when $t = \frac{\pi}{4}$:

(e) concavity of the curve when $t = \frac{\pi}{4}$:

10. (a) Use a graphing utility to graph the curve represented by the following parametric

equations: $\begin{cases} x = t^2 - t - 2 \\ y = t^3 - 3t \end{cases}$. (b) Find $\frac{dy}{dx}$. (c) Find all point(s) of *horizontal* tangency. (d) Find

all point(s) of *vertical* tangency. (e) **Label** the point(s) of *horizontal* tangency and the point(s) of *vertical* tangency on the curve. (Be careful with your notation, show orientation arrows on your curve, use calculus to demonstrate your results, and show your steps clearly.)



(b) $\frac{dy}{dx} =$

(c) point(s) of *horizontal* tangency:

(d) point(s) of *vertical* tangency:

11. (a) Use a graphing utility to graph the curve represented by the following parametric

equations: $\begin{cases} x = 4 + 2\cos(\theta) \\ y = -1 + \sin(\theta) \end{cases}$. (b) Find $\frac{dy}{dx}$. (c) Find all point(s) of *horizontal* tangency. (d)

Find all point(s) of *vertical* tangency. (e) **Label** the point(s) of *horizontal* tangency and the point(s) *vertical* tangency on the curve. (Be careful with your notation, show orientation arrows on your curve, use calculus to demonstrate your results, and show your steps clearly.)



(b) $\frac{dy}{dx} =$

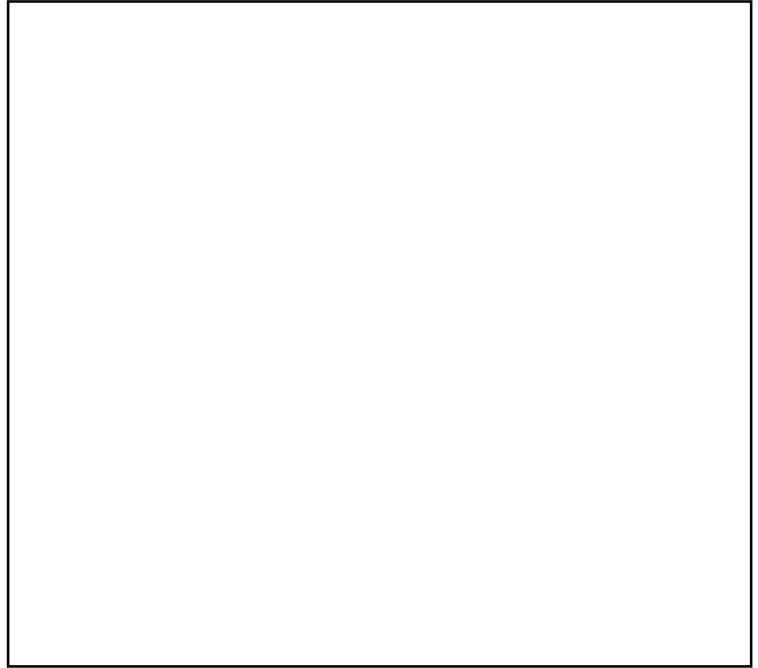
(c) point(s) of *horizontal* tangency:

(d) point(s) of *vertical* tangency:

12. (a) Use a graphing utility to graph the curve represented by the following parametric

equations: $\begin{cases} x = 2t - t^2 \\ y = 2t^{\frac{2}{3}} \end{cases}$ over the interval $1 \leq t \leq 2$. (b) Write an integral that represents the

arc length of this curve over the interval $1 \leq t \leq 2$. (*Do not attempt to evaluate this integral algebraically.*) (c) Use the **numerical integration capability** of a graphing utility to approximate the value of this integral. Round your result to the nearest **tenth**. (*Be careful with your notation, show orientation arrows on your curve, and show your steps clearly.*)



(b) arc length integral = _____

(c) arc length *approximation* \approx _____

13. (a) Use a graphing utility to graph the curve represented by the following parametric equations: $\begin{cases} x = t^2 \\ y = 2t \end{cases}$ over the interval $0 \leq t \leq 2$. (b) Write an integral that represents the arc

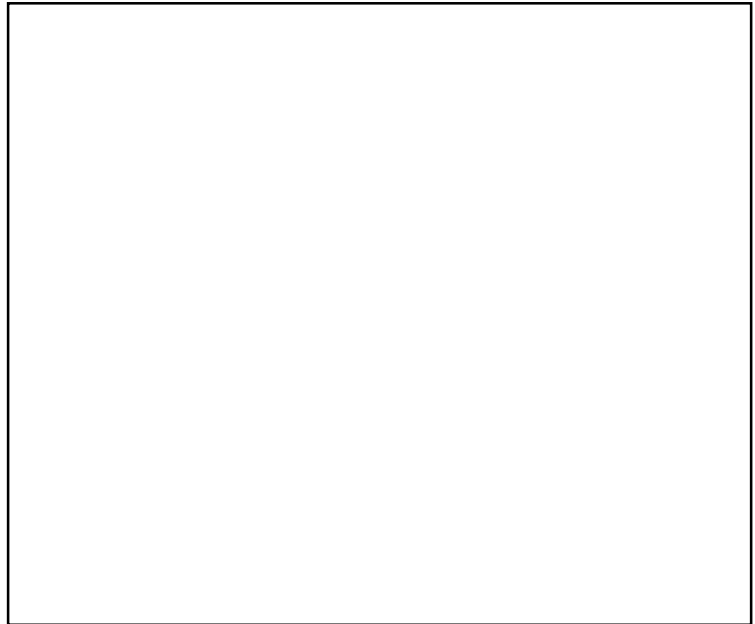
length of this curve over the interval $0 \leq t \leq 2$. (c) Use a table of integrals to complete the computation of this arc length integral, and the **numerical integration capability** of a graphing utility to approximate the value of this integral. Round your result to the nearest **tenth**. (*Be careful with your notation, show orientation arrows on your curve, and show your steps clearly.*)



(b) arc length integral = _____

(c) arc length *approximation* \approx _____

14. (a) Use a graphing utility to graph the curve represented by the following polar equation: $r(\theta) = 2\cos(\theta)$ over the interval $0 \leq \theta < \pi$. (b) Find $\frac{dy}{dx}$. (c) Find all points of *horizontal* tangency. (d) Find all points of *vertical* tangency. (e) **Label** these points of *horizontal* tangency and the points of *vertical* tangency on the curve. (Be careful with your notation, show orientation arrows on your curve, use calculus to demonstrate your results, and show your steps clearly.)



(b) $\frac{dy}{dx} =$

(c) point(s) of *horizontal* tangency:

(d) point(s) of *vertical* tangency:

15. (a) Use a graphing utility to graph the curve represented by the following polar equation:

$r(\theta) = 1 - \sin(\theta)$ over the interval $0 \leq \theta < 2\pi$. (b) Find $\frac{dy}{dx}$. (c) Find all points of *horizontal* tangency. (d) Find all points of *vertical* tangency. (e) **Label** these points of *horizontal* tangency and the points of *vertical* tangency on the curve. (Be careful with your notation, show orientation arrows on your curve, use calculus to demonstrate your results, and show your steps clearly.)

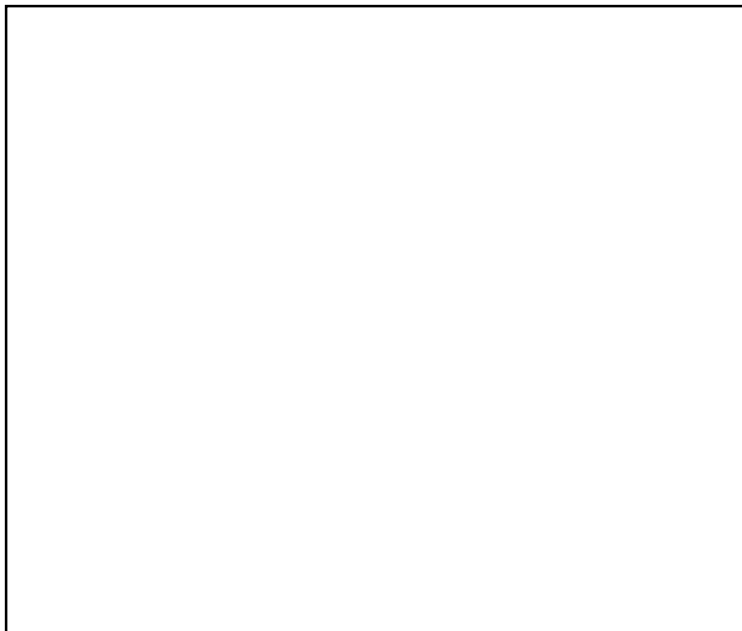


(b) $\frac{dy}{dx} =$

(c) point(s) of *horizontal* tangency:

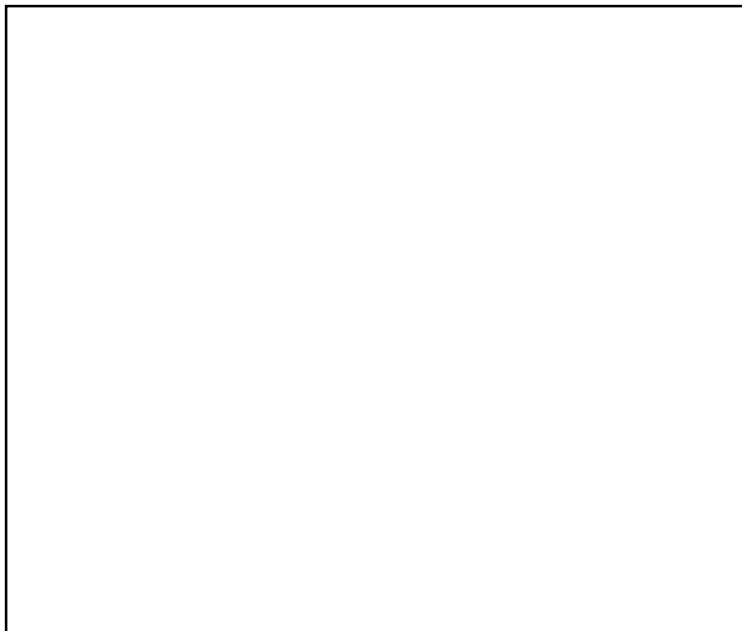
(d) point(s) of *vertical* tangency:

16. **(a)** Use a graphing utility to graph the curve represented by the following polar equation: $r(\theta) = 6\sin(2\theta)$ over the interval $0 \leq \theta \leq 2\pi$. **(b)** Find the area of one petal of this curve. **(c) Shade** the interior of the petal whose area you are computing. (*Be careful with your notation, show orientation arrows on your curve, and show your steps clearly.*)



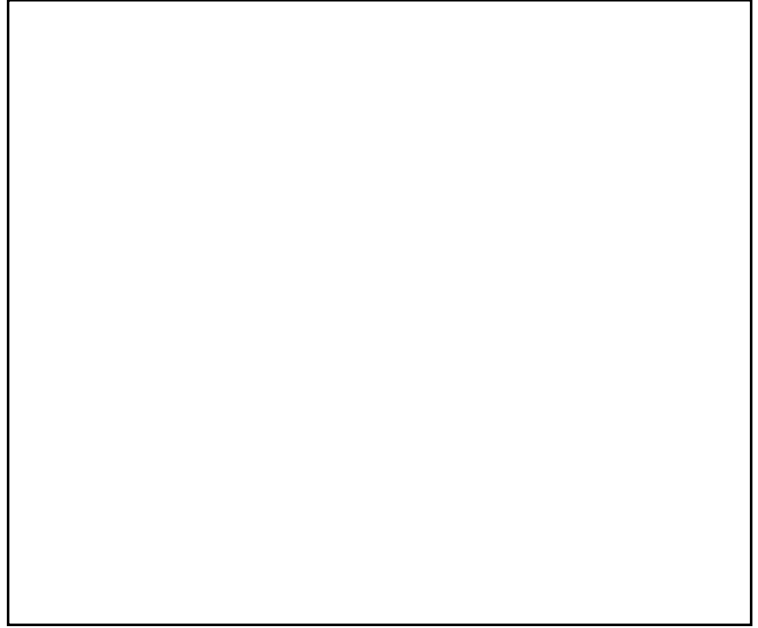
(b) area of one petal of this curve = _____

17. **(a)** Use a graphing utility to graph the curve represented by the following polar equation: $r(\theta) = 3\cos(3\theta)$ over the interval $0 \leq \theta \leq \pi$. **(b)** Find the area of one petal of this curve. **(c)** **Shade** the interior of the petal whose area you are computing. (*Be careful with your notation, show orientation arrows on your curve, and show your steps clearly.*)



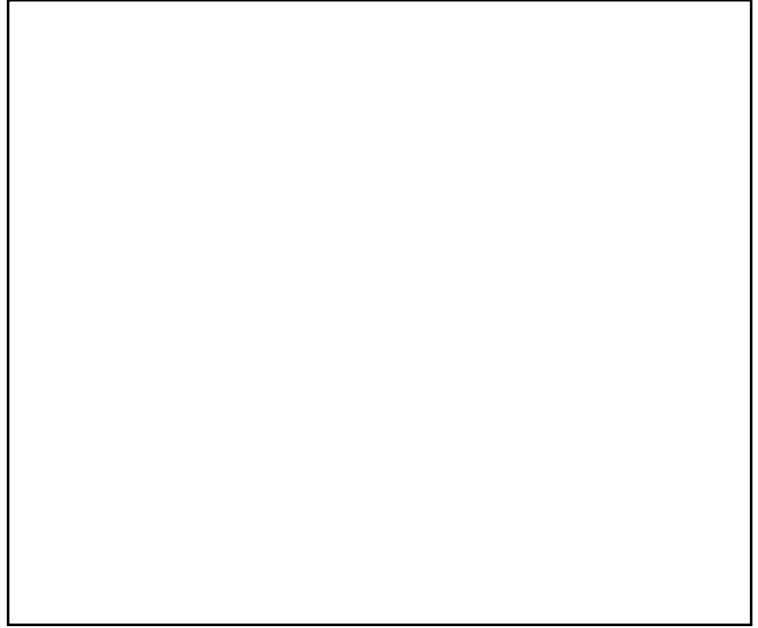
(b) area of one petal of this curve = _____

18. **(a)** Use a graphing utility to graph the curve represented by the following polar equation: $r(\theta) = 1 + \sin(\theta)$ over the interval $0 \leq \theta \leq 2\pi$. **(b)** Find the arc length of this curve over the interval $0 \leq \theta \leq 2\pi$. (Be careful with your notation, show orientation arrows on your curve, and show your steps clearly.)



(b) arc length of this curve over the interval $0 \leq \theta \leq 2\pi =$ _____

19. **(a)** Use a graphing utility to graph the curve represented by the following polar equation: $r(\theta) = 2 - 2\cos(\theta)$ over the interval $0 \leq \theta \leq 2\pi$. **(b)** Find the arc length of this curve over the interval $0 \leq \theta \leq 2\pi$. (Be careful with your notation, show orientation arrows on your curve, and show your steps clearly.)



(b) arc length of this curve over the interval $0 \leq \theta \leq 2\pi =$ _____