MATH 155 **Name**

Chapter 10 Practice Test

Use Algebraic Notation AND Show All of Your Work

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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) Labe**l 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)* ***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 $\dfrac{dy}{dx}$. **(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) $\dfrac{dy}{dx} =$

(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 $1 \le t \le 2$. **(b)** Write an integral that represents the arc length of this curve over the interval $1 \le t \le 2$. ***(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*** ≈ ________________________

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 $0 \le t \le 2$. **(b)** Write an integral that represents the arc length of this curve over the interval $0 \le t \le 2$. **(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*** ≈ ______________________________

14. **(a)** Use a graphing utility to graph the curve represented by the following polar equation: $r(\theta) = 2\cos(\theta)$ over the interval $0 \le \theta < \pi$. **(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 $0\le\theta<2\pi$. **(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 $0 \le \theta \le \pi$. **(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 $0 \le \theta \le 2\pi$. **(b)** Find the arc length of this curve over the interval $0 \le \theta \le 2\pi$. *(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 $0 \le \theta \le 2\pi =$ ____________________

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 $0 \le \theta \le 2\pi$. **(b)** Find the arc length of this curve over the interval $0 \le \theta \le 2\pi$. *(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 $0 \le \theta \le 2\pi =$