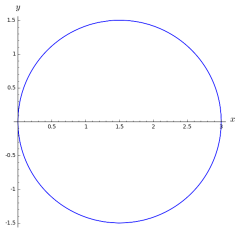
Name:_____
M243: Calculus II (Spring 2018)
Instructor: Justin Ryan
Unit IV Exam: Chapter 10 (In class)

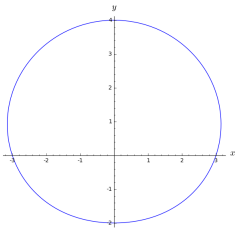
WICHITA STATE UNIVERSITY

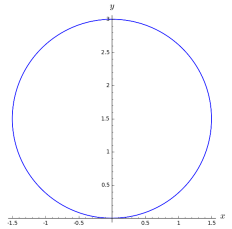
Read and follow all instructions. You may not use any notes or electronic devices. All you need is a pencil and your brain!

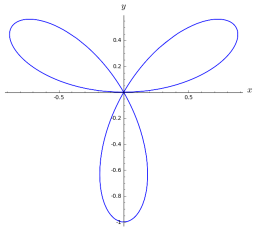
Multiple Choice [5 points each]
Select the best answer and write the corresponding letter on the line provided.

_____**1.** Choose the correct graph of the function $r(\theta) = 3\sin\theta$.

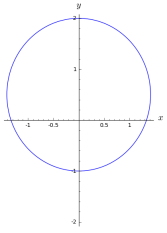
A. 

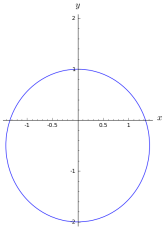
B. 

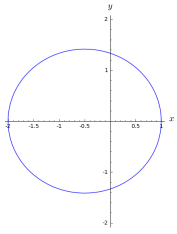
C. 

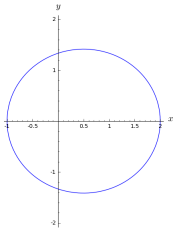
D. 

_____**2.** Choose the correct graph of the function $r(\theta) = \dfrac{4}{3+\sin\theta}$.

A. 

B. 

C. 

D. 

_____**3.** Compute the rate of change $\frac{dy}{dx}$ for the parametric curve.

$$\begin{cases} x = \ln t \\ y = 1 + t^2 \end{cases}$$

A. $\frac{1}{t}$ **B.** $2t$

C. $2t^2$ **D.** $\frac{1}{2t^2}$

_____**4.** What is the equation of the directrix of the conic section?

$$r = \frac{3}{4 - 3\cos\theta}$$

A. $x = \frac{3}{4}$ **B.** $x = 1$

C. $y = -1$ **D.** $x = -1$

_____**5.** Consider the polar function $r = 1 - 2\cos\theta$. Which integral represents the area enclosed by the inner loop?

A. $\frac{1}{2}\int_{-\frac{\pi}{3}}^{\frac{\pi}{3}} (1 - 2\cos\theta)^2 \, d\theta$ **B.** $\frac{1}{2}\int_{\frac{\pi}{3}}^{\frac{5\pi}{3}} (1 - 2\cos\theta)^2 \, d\theta$

C. $\frac{1}{2}\int_{\frac{\pi}{3}}^{\frac{5\pi}{3}} 1 - 2\cos\theta \, d\theta$ **D.** $\int_{-\frac{\pi}{3}}^{\frac{\pi}{3}} \sqrt{1 - 2\cos\theta} \, d\theta$

_____**6.** Find the polar equation of the line $y = -\frac{1}{2}x + 1$.

A. $r = \dfrac{2}{2\sin\theta + \cos\theta}$

B. $r = \dfrac{1}{\sin\theta - \frac{1}{2}\cos\theta}$

C. $r = \dfrac{2}{\sin\theta + 2\cos\theta}$

D. $r = \frac{1}{2}\tan\theta - 1$

_____**7.** Consider the parametric curve.

$$\begin{cases} x = 1 + t^2 \\ y = 2t \end{cases}$$

Which integral represents the arc length of the curve between the points $(1,0)$ and $(5,4)$?

A. $\displaystyle\int_0^4 \sqrt{t^4 + 6t^2 + 1}\,dt$

B. $\displaystyle\int_1^5 \sqrt{4t^2 + 4}\,dt$

C. $\displaystyle\int_0^2 \sqrt{(1+t^2)^2 + (2t)^2}\,dt$

D. $\displaystyle\int_0^2 2\sqrt{t^2 + 1}\,dt$

_____**8.** Which integral represents the surface area of a sphere of radius R?

A. $\displaystyle 2\pi\int_0^\pi R\sqrt{R^2\sin^2 t + R^2\cos^2 t}\,dt$

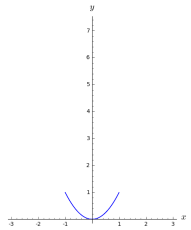
B. $\displaystyle 2\pi\int_0^\pi R^2\sin t\,dt$

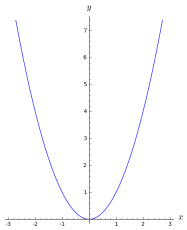
C. $\displaystyle\int_0^{2\pi} R\sin t + R\cos t\,dt$

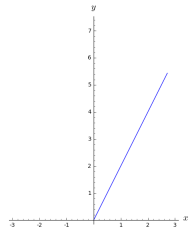
D. $\displaystyle\frac{1}{2}\int_0^{2\pi} R^2\sin^2 t\,dt$

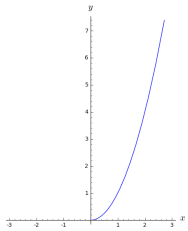
_____**9.** Choose the graph that corresponds to the parametric function.

$$\begin{cases} x = e^t \\ y = e^{2t} \end{cases}$$

A. 

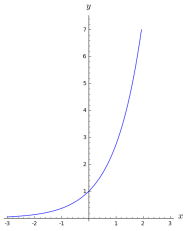
B. 

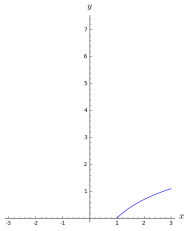
C. 

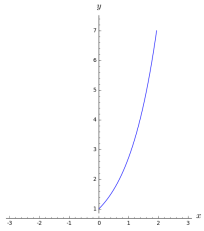
D. 

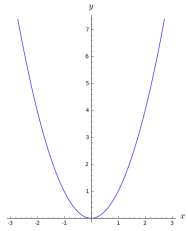
_____**10.** Choose the graph that corresponds to the parametric function.

$$\begin{cases} x = \ln t \\ y = t \end{cases}$$

A. 

B. 

C. 

D. 

Written Problems [5 points each]
Complete all problems, showing enough work. Be sure to only do as much work as the problem asks you to do.

11. Write the integral that corresponds to the arc length around one loop of the graph of the function $r = \sin(2\theta)$. Simplify the integrand, but do **NOT** compute the integral.

12. Consider the parametric function.

$$\begin{cases} x = \sin t \\ y = 1 - \cos^2 t \end{cases}$$

Write an integral that represents the area underneath the curve (between the curve and the x-axis). Simplify the integrand, but do **NOT** compute the integral.