

Name: \_\_\_\_\_

Student ID: \_\_\_\_\_

**CARLETON UNIVERSITY  
DEPARTMENT OF MATHEMATICS & STATISTICS**

*MATH 2004-C (Fall 2018)  
Test 1 (Tuesday, October 1, 2019)*

Time: 50 minutes (no cellphones, notes, books, talking). Use the back of the paper to show your work for long answer questions.

**MARKS**

- (1) 1. Which of the following is **NOT** representing a hyperbola?

(a)  $(x-1)y = 1$

(b)  $4x^2 - 4 = y^2$

(c)  $x^2 + y^2 + 2y = 0$

- (1) 2. Which of the following is a parametric form of a parabola?

(a)  $\begin{cases} x = t \\ y = t^3 \end{cases}$

(b)  $\begin{cases} x = t \\ y = (t-1)^2 \end{cases}$

(c)  $\begin{cases} x = t^2 \\ y = t^3 \end{cases}$

- (1) 3. Which of the following curves has a finite length? (hint: try to sketch them)

(a)  $r \cos \theta = 1$

(b)  $\theta = \frac{\pi}{4}$

(c)  $r = \sin \theta$

- (1) 4. What is the area of the region bounded by the curve  $\begin{cases} x = \sin t \\ y = \cos t \end{cases}$  and in the first quadrant. (hint: try to sketch the curve)

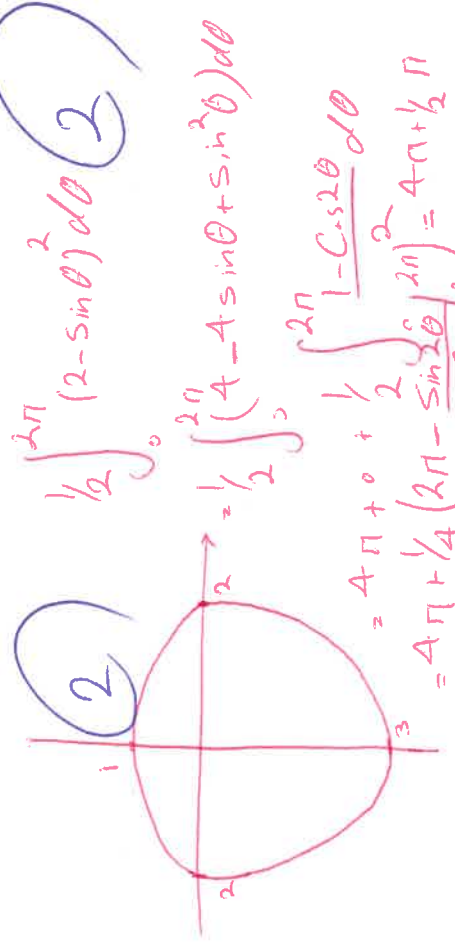
(a) 2

(b)  $\pi$

(c)  $\frac{\pi}{4}$

- (6) 5. Sketch the curve  $r = 2 - \sin \theta$ . Then find the area of the bounded region.

$r$	$\theta$
2	0
$2 + \frac{\sqrt{3}}{2}$	$\frac{\pi}{6}$
$2 + \frac{\sqrt{3}}{2}$	$\frac{\pi}{3}$
2	$\frac{\pi}{2}$
$2 - \frac{\sqrt{3}}{2}$	$\frac{2\pi}{3}$
$2 - \frac{\sqrt{3}}{2}$	$\frac{5\pi}{6}$
2	$\pi$



- (4) 6. Consider the curve  $C$  parametrized by  $\begin{cases} x = \sin^2 t \\ y = \cos^2 t \end{cases}$ . Set up (do not solve) an integral to find the length of the curve for  $0 \leq t \leq \frac{\pi}{2}$ .

$$\int_0^{\pi/2} \sqrt{(2 \sin t \cos t)^2 + (2 \sin t \cos t)^2} dt \int_0^{\pi/2} \sqrt{2(2 \sin t \cos t)^2}$$

$$= \sqrt{2} \int_0^{\pi/2} 2 \sin t \cos t$$

(4)