

Math 126 C - Autumn 2010  
Mid-Term Exam Number Two  
November 23, 2010

Name: \_\_\_\_\_ Student ID no. : \_\_\_\_\_

Signature: \_\_\_\_\_ Section: \_\_\_\_\_

1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

- Complete all questions.
- You may use a scientific, non-graphing calculator during this examination. Other electronic devices are not allowed, and should be turned off for the duration of the exam.
- If you use a trial-and-error or guess-and-check method when an algebraic method is available, you will not receive full credit.
- You may use one hand-written 8.5 by 11 inch page of notes.
- Show all work for full credit.
- You have 50 minutes to complete the exam.

1. Let  $f(x, y) = \frac{9}{4}xy^2 + y^3 - x$ . Find and classify all critical points of  $f$ .

2. Evaluate the following integrals.

(a)  $\int_1^2 \int_3^{x^2} \left( xe^y + \frac{1}{x^3} \right) dy dx$

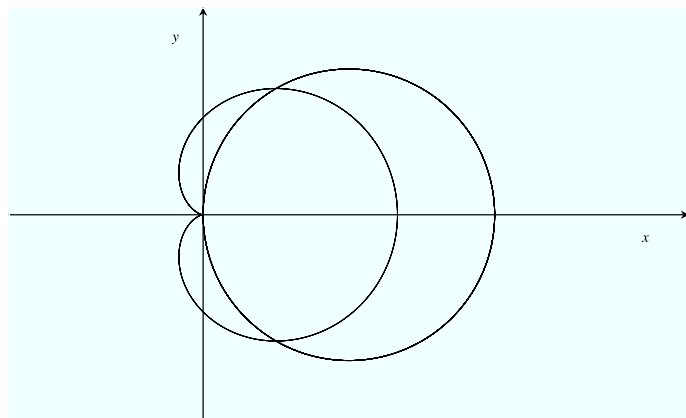
(b)  $\int_0^4 \int_{2y}^8 \cos x^2 dx dy$

3. Find the area of the region outside the cardioid

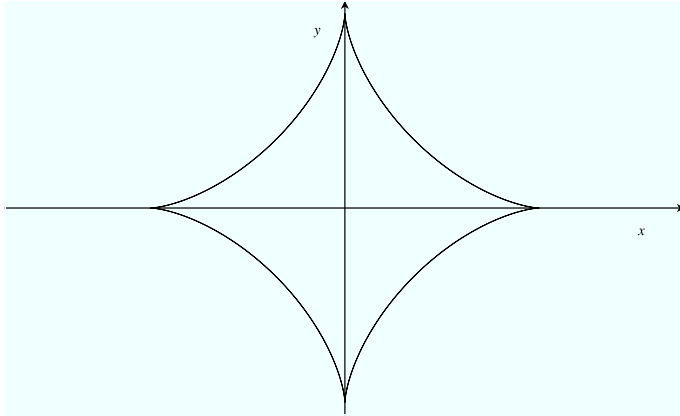
$$r = 2 + 2 \cos \theta$$

and inside the circle

$$r = 6 \cos \theta.$$



4. Give the  $t$  value corresponding to a point on the hypocycloid  $x = \cos^3 t, y = \sin^3 t$  at which the curvature is 1.2.



5. Let  $f(x, y) = xy + x - 2y$ .

(a) Find the equation of the tangent plane to  $z = f(x, y)$  at the point  $(-2, 4, -18)$ .

(b) Find two points on the surface  $z = f(x, y)$  where the tangent planes are orthogonal to each other.