

**Guidelines**

- **Calculators are not allowed.**
  - Read the questions carefully. You have 65 minutes; use your time wisely.
  - You may leave your answers in symbolic form, like  $\sqrt{3}$  or  $\ln(2)$ , unless they simplify further like  $\sqrt{9} = 3$  or  $\cos(3\pi/4) = -\sqrt{2}/2$ .
  - Put a box around your final answers when relevant.
  - Show all steps in your solutions and make your reasoning clear. Answers with no explanation will not receive full credit, even when correct.
  - Use the space provided. If necessary, write “see other side” and continue working on the back of the same page.
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1. (8 points) To be completed once exams are graded and returned. Please correct any problem with points deducted. All corrections should be completed neatly on a separate sheet of paper. Once you have finished your corrections, take your exam and corrections to the Office of Student Learning (OSL), and a tutor will check your answers and sign below. The checked solutions should be given to your instructor.

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

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

Date: \_\_\_\_\_

2. For the point with Cartesian coordinates  $(-3\sqrt{3}, -3)$ , find polar coordinates  $(r, \theta)$  with

a. (3 points)  $r > 0$  and  $0 \leq \theta < 2\pi$ ;

b. (3 points)  $r < 0$  and  $0 \leq \theta < 2\pi$ .

3. (8 points) Convert the Cartesian equation  $(x-3)^2 + (y-2)^2 = 13$  to the equivalent polar equation.

4. (8 points) Convert the polar equation  $r = \frac{6}{\cos \theta - \sin \theta}$  to equivalent Cartesian equation.

5. Consider the parametric equations  $x = \frac{1}{2}t^2$ ,  $y = t^4$  for  $-1 \leq t \leq \sqrt{4}$ .

a. (6 points) Eliminate the parameter to obtain an equation in  $x$  and  $y$ .

b. (4 points) Sketch the curve.

6. (12 points) Sketch the loops of  $r = 3 \cos(5\theta)$  and find the area enclosed by one loop.

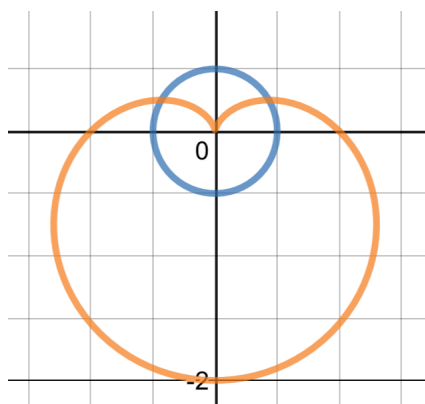
7. (8 points) Find an equation of the line tangent to the parametric curve  $x = \cos(2t)$ ,  $y = \sin(3t)$  at  $t = -\frac{\pi}{12}$

8. (8 points) Find the slope of the tangent line to the polar curve  $r = 8 \sin \theta$  at  $\theta = \frac{5\pi}{6}$ .

9. (12 points) Determine the radius and interval of convergence for the series 
$$\sum_{k=1}^{\infty} \frac{(x+3)^k}{k 5^k}$$

10. (12 points) Find the Taylor Series for  $f(x) = \frac{1}{3x - 2}$  at  $a = 2$ .

11. (8 points) Find the area inside the circle  $r = \frac{1}{2}$  and outside  $r = 1 - \sin \theta$ . Set up the integral; but, do not evaluate.



Question	Points	Score
1	8	
2	6	
3	8	
4	8	
5	10	
6	12	
7	8	
8	8	
9	12	
10	12	
11	8	
Total:	100	