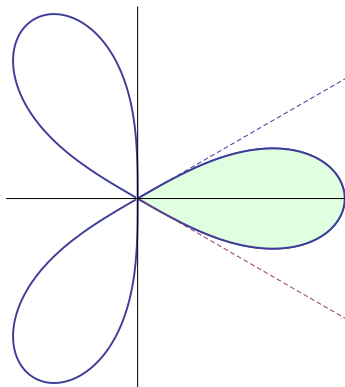*University of California, San Diego*
Department of Mathematics

Instructions

1. Write your *Name*, *PID*, *Section*, and *Exam Version* on the front of your Blue Book.

2. No calculators or other electronic devices are allowed during this exam.

3. You may use one page of notes, but no books or other assistance during this exam.

4. Write your solutions clearly in your Blue Book

    (a) Carefully indicate the number and letter of each question.

    (b) Present your answers in the same order they appear in the exam.

    (c) Start a new answer on a new page.

5. Show all of your work; no credit will be given for unsupported answers.

---

1. (12 points) Find the area of the shaded region. The equation of the graph is $r^2 = \cos(3\theta)$.

2. (12 points) Compute the integral

$$\int \frac{1}{(x-1)(x^2+1)}\, dx.$$

3. (10 points) Compute the integral

$$\int \frac{x^2}{(9-x^2)^{3/2}}\, dx.$$

(*Hint:* $\int \tan^2\theta\, d\theta = \tan\theta - \theta + C.$)

4. (6 points) Find the 5th roots of i. Express your answer in polar form: $r(\cos\theta + i\sin\theta)$.

(This exam is worth 40 points.)