

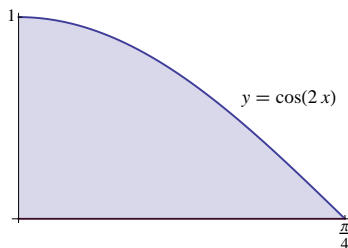


University of California, San Diego  
Department of Mathematics

### 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. Read each question carefully, and answer each question completely.
5. Write your solutions clearly in your Blue Book.
  - (a) Carefully indicate the number and letter of each question and question part.
  - (b) Present your answers in the same order they appear in the exam.
  - (c) Start each problem on a new page.
6. Show all of your work. No credit will be given for unsupported answers, even if correct.
7. Turn in your exam paper with your Blue Book.

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0. (1 point) Carefully read and complete the instructions at the top of this exam sheet and any additional instructions written on the chalkboard during the exam.
  1. (4 points) Write  $(1 + i)^{2013}$  in the form  $x + iy$ .
  2. (7 points) Compute the indefinite integral:  $\int x^3 \ln(3x) dx$ .
  3. (8 points) Compute the indefinite integral:  $\int \frac{x^2}{(x^2 - 9)^{5/2}} dx$ .
  4. (7 points) Determine if the improper integral converges or diverges. If it converges, find the value to which it converges:  $\int_1^e \frac{1}{x(\ln x)^{1/3}} dx$ .
  5. (7 points) Find the volume of the solid region obtained by rotating  $y = \cos(2x)$  over the interval  $[0, \pi/4]$  about the  $x$ -axis.



6. (4 points) Determine whether the series converges or diverges. Justify your answer:  $\sum_{n=1}^{\infty} \sin\left(\frac{1}{n^2}\right)$ .
7. (7 points) Find the Interval of Convergence for the power series  $\sum_{n=1}^{\infty} \frac{(x-7)^n}{n \cdot 3^n}$ .
8. (5 points) Find the Taylor series centered at  $c = 1$  for  $f(x) = e^{3x}$ . Your answer should have the form  $f(x) = \sum_{n=0}^{\infty} a_n(x-1)^n$ .

(This exam is worth 50 points.)