

ON THE FRONT OF YOUR BLUEBOOK write: (1) your name, (2) your student ID number, (3) your instructor's name, (4) your recitation number, and (5) a grading table. You must work all of the problems on the exam. Show ALL of your work in your bluebook and **BOX IN YOUR FINAL ANSWERS**. A correct answer with no relevant work may receive no credit, while an incorrect answer accompanied by some correct work may receive partial credit. Text books, class notes and calculators are NOT permitted. A two-page crib sheet is allowed. Please start each new problem on a new page of the bluebook.

- (10 points) Find the center, foci and vertices of the ellipse $4x^2 + y^2 + 8x - 2y = -1$.
- (10 points) Find $\frac{d^2y}{dx^2}$ for the parametric curve $x = t - \sin(t)$, $y = 1 - \cos(t)$ at $t = \pi$.
- (15 points) Find the length of the curve $x = t - \sin(t)$, $y = 1 - \cos(t)$ with $0 \leq t \leq 2\pi$.
- (10 points) Sketch the graph of $r = \frac{1}{2} + \cos(\theta)$.
- (15 points) Find the area enclosed by $r = 1 - \cos(\theta)$.
- (10 points) Set up, **but do not evaluate**, the integral(s) to find area that lies inside $r = 2 + \sin(\theta)$ and outside $r = 5/2$.
- (10 points) Consider the region in the first quadrant bounded by $y = x - x^2$. Set up, **but do not evaluate**, the integral to find the volume obtained by revolving the region about the line $y = -2$.
- (15 points) Find the volume of the solid generated by revolving about the x -axis, the region in the first quadrant bounded by $y = \sin(x)$ with $0 \leq x \leq \frac{\pi}{2}$.
- (10 points) Compute $\int e^{-x} \cos(x) dx$.
- (10 points) Compute $\int_0^1 \ln(x) dx$. (Hint: somewhere along the line, you'll need to use L'Hopital's rule.)
- (10 points) Compute $\int \frac{x+1}{x(x^2+1)} dx$.
- (5 points) Compute $\int_0^\infty \frac{dx}{(x-2)^2}$.
- (10 points) Find the sum of the convergent series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1} 3^{n+1}}{4^n}$.
- (20 points) Determine whether the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt{n^2+10}}$ is absolutely convergent, conditionally convergent, or divergent.
- (25 points) For the power series $\sum_{n=1}^{\infty} \frac{x^n}{2^n \sqrt{n}}$, determine the interval of convergence. Identify where the power series is absolutely convergent and where it is conditionally convergent.
- (15 points) Using Maclaurin series, compute $\int_0^{1/10} e^{-x^2} dx$. Also, estimate how accurately the first four non-zero terms of the series approximate the integral's value. You may leave your answer in terms of factorials, etc.