

Name (print) _____ Signature _____

UIC ID _____

- (1) *Write* your name on your examination booklet.
- (2) *Write* your answers in the exam booklet provided.
- (3) *Return* your copy of the examination with the examination booklet(s).
- (4) *Show* your work. **An unjustified answer receives no credit.**
- (5) There are **10** questions on this examination. Check to see that this copy is complete.
- (6) You may not use a calculator.
- (7) *You are expected to abide by the University's rules concerning academic honesty.*
- (8) *Circle* your instructor's name

Cohen Heard Klaff (10 AM) Klaff (1 PM) Kobotis

- (9) *Provide* your discussion section information

TA's name: _____ Discussion time: _____



Do not write in this area.

1	2	3	4	5	6	7	8	9	10
50	15	15	15	15	15	15	30	20	10

SCORE _____ /200



1. (50) Compute the following indefinite integrals:

$$\begin{aligned}
 (a) \int \ln(\sqrt{x}) dx & \quad (b) \int x^3 e^{x^2} dx & \quad (c) \int \frac{dx}{x^2 + 4x + 5} \\
 (d) \int \frac{6x^2 - 2x - 4}{x^3 - 4x} dx & \quad (e) \int \tan x dx
 \end{aligned}$$

2. (15) Compute the definite integral: $\int_0^1 \frac{x^2 dx}{x^3 + 1}$

3. (15) Determine whether the improper integral: $\int_1^{+\infty} \frac{dx}{x^2 + \sqrt{x}}$ converges or not. Justify your answer.

4. (15) Compute the exact value of the improper integral $\int_e^{+\infty} \frac{dx}{x(\ln x)^2}$.

5. (15) Compute the sum of the series $\sum_{n=2}^{+\infty} \frac{(-1)^n 3^{n-1}}{5^{n-3}}$

6. (15) Find the volume of the solid that is obtained by revolving the region bounded by the graph of $y = x^2$ and $y = x$ about the y -axis.

7. (15) Give the first four non-zero terms of the Maclaurin expansion of the function $f(x) = \cos(3x)$.

8. (30) Determine whether the following series converge or not:

$$(a) \sum_{n=1}^{+\infty} \frac{2^n}{n^3} \quad (b) \sum_{n=2}^{+\infty} \frac{(-1)^n}{\ln n} \quad (c) \sum_{n=1}^{+\infty} \frac{1}{2 + \sqrt{n}}$$

9. (20) Find the interval of convergence of the power series $\sum_{n=2}^{+\infty} \frac{3^n x^{n^2}}{n}$. (Remark: Do not forget to examine convergence at the endpoints separately.)

10. (10) Determine the arclength of the graph of the function $f(x) = 2x^{3/2} + 15$ between $x = 0$ and $x = 1$.