

Spring Semester 2007

# MA2160 Final Exam - PART 1

Calculators are NOT allowed on Part 1.

Turn in Part 1 BEFORE you take out your calculator.

Name:(print) \_\_\_\_\_ ID#: \_\_\_\_\_

Score - Part 1: \_\_\_\_ / 50

Score - Part 2: \_\_\_\_ / 50

Score - Total: \_\_\_\_ / 100

Circle your section number:

Section	Time	Instructor	Section	Time	Instructor
01	08:05	S. Tao	07	11:05	A. Niu
02	12:05	H. Wang	08	12:05	S. Butler
03	09:05	R. Targove	09	14:05	K. Feigl
04	08:05	D. Yorgov	10	15:05	L. Erlebach
05	10:05	A. Roy	11	16:05	L. Erlebach
06	11:05	H. Wang	12	14:05	S. Butler

- Justify all answers and show all work! No work, no credit!
- Frame your answers.

1. (5 pts) Evaluate  $\int \frac{x+2}{2x^2+3x+1} dx$ .

2. (6 pts) Evaluate  $\int_0^1 x^3 \sqrt{x^4+2} dx$ .

3. (5 pts) Evaluate  $\int \theta \cos(3\theta) d\theta$ .

4. (6 pts) Find the function  $y(t)$  that solves the initial value problem:  $\frac{dy}{dt} = y^2(1+t)$ ,  $y(1) = 2$ .

5. Write each improper integral in terms of well-defined operations using limits of proper integrals. Then find the value of the integral, if it converges, or state that it does not converge.

(a) (5 pts)  $\int_{-\infty}^{-1} \frac{1}{(2x+1)^2} dx$

(b) (5 pts)  $\int_{-1}^1 \frac{1}{x} dx$

6. Consider the vectors  $\vec{v} = 2\vec{j} + \vec{k}$ ,  $\vec{w} = -\vec{i} + \vec{j} - 2\vec{k}$  and  $\vec{u} = 3\vec{i} - \vec{j} + \vec{k}$ .

(a) (3 pts) Are  $\vec{v}$  and  $\vec{w}$  perpendicular? Why or why not?

(b) (3 pts) Find a vector of length 2 that points in the same direction as  $\vec{u}$ .

(c) (3 pts) Find the angle between  $\vec{w}$  and  $\vec{u}$ .

7. (3 pts) Use the Midpoint Rule to estimate the value of  $\int_0^4 (x^2 + 2) dx$  using  $n = 2$  subintervals.

8. Find the sum of each geometric series, if it converges, or state why it does not converge.

(a) (3 pts)  $\sum_{k=1}^{\infty} \left(\frac{2}{3}\right)^k$ .

(b) (3 pts)  $-2 + 3 - \frac{9}{2} + \frac{27}{4} - \frac{81}{8} + \dots$ .