

MA 114 - Calculus II
PRACTICE
FINAL EXAM

Spring 2004
05/07/2004

Name: _____ Sec.: _____

SEC.	INSTRUCTORS	T.A.'S	LECTURES	RECITATIONS
001	A. Corso	D. Watson	MWF 8:00-8:50, CP 222	TR 8:00-9:15, CB 347
002	A. Corso	D. Watson	MWF 8:00-8:50, CP 222	TR 12:30-1:45, CP 155
003	A. Corso	S. Petrovic	MWF 8:00-8:50, CP 222	TR 3:30-4:45, CB 347

Answer all of the following questions. Use the backs of the question papers for scratch paper. No books or notes may be used. You may use a calculator. You may not use a calculator which has symbolic manipulation capabilities. When answering these questions, please be sure to:

- check answers when possible,
- clearly indicate your answer and the reasoning used to arrive at that answer (*unsupported answers may receive NO credit*).

QUESTION	SCORE	TOTAL
1.		10
2.		30
3.		10
4.		10
5.		15
6.		10
7.		10
8.		10
9.		10
Bonus.		5
TOTAL	out of 100 pts	120

1. Find dy/dx for each of the following functions:

(a) $y = \tan^{-1}(e^{3x})$

$dy/dx =$ _____

(b) $y = x^{\sin x}$

$dy/dx =$ _____

(c) $y = \ln(\ln(x^2))$

$dy/dx =$ _____

pts: /10

2. Evaluate the following integrals. Each problem is worth 5 points.

(a) $\int \frac{e^{2x}}{1+e^{2x}} dx =$ _____.

(b) $\int \frac{x^2 + 2x + 3}{(x^2 + 1)(x + 1)} dx =$ _____.

(c) $\int x^2 \ln x dx =$ _____.

pts: /15

2.(cont.d)

(d) $\int \frac{x^2}{\sqrt{1-x^2}} dx =$ _____.

(e) $\int x\sqrt{1+x} dx =$ _____.

(f) $\int \frac{3x^4 + 2x^2 + x - 1}{1+x^2} dx =$ _____.

pts: /15

3. An isotope of strontium, Sr^{90} , has a half-life of 25 years.

(a) Find the mass $Q(t)$ of Sr^{90} that remains from a sample of 18 mg after t years.

(b) How long would it take for the mass to decay to 2 mg?

pts: /10

4. (5 pts each) Find the limits of the following sequences:

(a) $a_n = \left(1 - \frac{1}{n}\right)^n$;

(b) $a_n = (-1)^n \frac{n+1}{n}$;

pts: /10

5. (5 pts each) Determine if the following series are absolutely convergent, conditionally convergent, or divergent.

(a) $\sum_{n=2}^{\infty} (-1)^n \frac{1}{\sqrt{2+n}}$;

(b) $\sum_{n=1}^{\infty} \frac{n^2}{4^n}$;

(c) $\sum_{n=1}^{\infty} \frac{\sin(n)}{n^3}$.

pts: /15

6. (a) Find the interval of convergence of the power series

$$\sum_{n=0}^{\infty} \frac{3n}{2^n} x^{2n}.$$

(b) Find the 4th degree Taylor polynomial centered at $a = -1$ for $f(x) = \ln(2+x)$.

pts: /10

7. (a) Find the area bounded by the curve

$$x(t) = \cos t \quad y(t) = e^t \quad 0 \leq t \leq \pi/2,$$

and the lines $y = 1$ and $x = 0$.

(b) Find the length of the curve

$$x(t) = e^t - t \quad y(t) = 4e^{t/2} \quad 0 \leq t \leq 1.$$

pts: /10

8. (a) Sketch the curve

$$x(t) = t^2 \quad y(t) = t^3 - t$$

(b) Find the coordinates of the point where the curve crosses itself.

(c) Find the equations of the tangent lines at the point in part (b).

pts: /10

9. Solve the initial value problem $\frac{dy}{dx} = xy + x$ $y(1) = 0$.

pts: /10

Bonus. Sketch carefully the graphs of the following equations given in polar coordinates

$$r = 1 - \cos \theta \quad r = \cos \theta$$

Label and give the coordinates of all the points of intersection.

Why not check all your work?

pts: /5