



Math 214-2 Common Final

Winter Quarter 2001

Wednesday, March 14, 2001

Check your instructor's name and section:

Anita	8:00		Vilonen	12:00	
Sally	9:00		Schemmerhorn	1:00	
Sally	10:00		Bode	1:00	
Panfilov	11:00				

Prob.	Possible points	Score
1	8	
2	20	
3a,b	16	
3c,d	16	
4a,b	18	
4c	10	
5	12	
6	20	
7	36	
8	14	
9	10	
10	20	
TOTAL	200	

Instructions:

Show *all* your work on these sheets. Feel free to use the opposite side. Make sure that your final answer is clearly indicated. No calculators, books, notes, etc. are allowed. Good luck!

1. (8 points) Use Simpson's rule to approximate $\int_0^4 f(x) dx$.

x	0	1	2	3	4
f(x)	0	0	2	6	12

2. (20 points) Find $\frac{dy}{dx}$. (10 points each)
- (a) $\sin(e^{xy}) = \ln x$, $x > 0$

(b) $y = (3^{\sqrt{x}})^{\tan x}$

3. (32 points) Evaluate the following integrals: (8 points each)

(a) $\int (x^2 + 1)e^x dx$

(b) $\int \cos^3 x \sin^3 x dx$

(c) $\int t (\ln t)^2 dt$

(d) $\int \frac{dx}{\sqrt{3 - 2x - x^2}}$

4. (28 points)

(a) (10 points) Use integration by parts to evaluate the integral:

$$\int \sin(\ln t) dt$$

(b) (8 points) Evaluate the following integral if it converges.

$$\int_0^{\infty} \frac{dx}{1+x^2}$$

(c) (10 points) Use a trigonometric substitution to evaluate the integral:

$$\int \frac{dx}{x^2 \sqrt{x^2 + 4}}$$

5. (12 points)

Use partial fractions to evaluate the integral:

$$\int \frac{2x^2 - x + 4}{x^3 + 4x} dx$$

6. (20 points) Find the following limits: (10 points each)

(a) $\lim_{x \rightarrow \infty} \frac{x}{\ln(1 + 2e^x)}$

(b) $\lim_{x \rightarrow 0^+} (x + \sin x)^x$

7. (36 points) Consider the plane region R enclosed by the curves $y = x$ and $y = x^2$.

(12 points each)

(a) Calculate the volume of the solid obtained by revolving R about the x -axis.

(b) Calculate the volume of the solid obtained by revolving R about the y -axis.

(c) Calculate the volume of the solid obtained by revolving R about the line $y = 2$.

8. (14 points) Find the arc length of the curve $y = 2x^{\frac{3}{2}}$ between $x = 0$ and $x = 3$.
9. (10 points) Find the Taylor polynomial $P_4(x)$ for the function $f(x) = \sin x + \cos x$ at $a = 0$.

10. (20 points) Calctown has a fixed population of 10,000 people. In January, 1000 people have had the flu. Two months later, 2000 people have had it. Assume that the rate of increase of the number $N(t)$ of people who have had the flu is proportional to the number who have not had it. How many people will have had the disease five months later, i.e., in June?