MATH 141

EXAM I

FEBRUARY 19, 2004

NAME _____

STUDENT NUMBER _____

INSTRUCTOR _____

SECTION NUMBER _____

This examination will be machine processed by the University Testing Service. Use only a number 2 pencil on your scantron. On your scantron identify your name, this course (Math 141) and the date. Code and blacken the corresponding circles on your scantron for your student I.D. number, section number and your **test form.**

There are 10 multiple choice questions worth a total of 50 points. For each problem **five** possible answers are given, only one of which is correct. **Circle** the correct answer in your exam booklet **and blacken** the corresponding space on the **scantron form**. Mark only one choice; darken the circle completely (you should not be able to see the letter after you have darkened the circle). Check frequently to be sure the problem number on the test is the same as the problem number of the scantron. There are **4** partial credit questions worth a total of 50 points. **In order to obtain full credit for these problems, all work must be shown**. **Credit will not be given for an answer not supported by work**. The point value for each question is shown to the left of the question number.

ALL CALCULATORS, NOTES, BOOKS, ETC. ARE FORBIDDEN.

MC (50 pts.)	_____
11. (15 Pts.)	_____
12. (12 Pts.)	_____
13. (12 Pts.)	_____
14. (11 Pts.)	_____
Total	_____

Do not write in the box to the left.

5 pts 1. Suppose $f(x) = x^4 + 2x^3 - 4$ for x in $[-\frac{3}{2}, +\infty)$. Find $(f^{-1})'(-1)$.

a) $\frac{1}{10}$

b) $\frac{1}{2}$

c) 2

d) 10

e) 0

5 pts 2. If $g(x) = \sin^{-1}(\cos x)$ and $0 \leq x \leq \pi$, then find $g'(x)$.

a) 0

b) 1

c) -1

d) $\frac{1}{\sin x}$

e) $\frac{1}{\sqrt{1 + \cos^2 x}}$

5 pts 3. Find the limit

$$\lim_{x\to 0} \frac{2x^3 - x^2}{\cos x - 1}$$

a) 0

b) 1

c) $+\infty$

d) 2

e) -1

5 pts 4. Find the limit

$$\lim_{x\to \infty} (1 + e^x)^{\frac{1}{x}}$$

a) 0

b) 1

c) e

d) $\dfrac{1}{e}$

e) $+\infty$

5 pts 5. Evaluate

$$\int_0^{\ln 2} \frac{e^{2x}}{1+e^x}\,dx$$

a) $1 - \dfrac{1}{3}\ln 2$

b) $1 + \ln\left(\dfrac{2}{3}\right)$

c) 2

d) 0

e) e

5 pts 6. Simplify

$$\sin(\tan^{-1} 2x)$$

a) $2x$

b) $\dfrac{2x}{\sqrt{4x^2+1}}$

c) $\dfrac{1}{\sqrt{4x^2+1}}$

d) $\dfrac{\sqrt{4x^2+1}}{2x}$

e) $\cos(\tan^{-1} x)$

5 pts 7. Find the definite integral

$$\int_0^{\frac{\pi}{2}} \sin^4 t \cos^3 t \, dt$$

a) $\frac{1}{15}$

b) $-\frac{1}{14}$

c) $\frac{2}{35}$

d) 7

e) $\frac{1}{14}$

5 pts 8. Find the general form of the partial fraction decomposition of the following expression

$$\frac{2x^4 + 6x^3 + 2x^2 + 18x + 5}{(x-1)(x+2)^2(x^2+3)}$$

a) $\frac{A}{x-1} + \frac{B}{(x+2)^2} + \frac{C}{x^2+3}$

b) $\frac{Ax+B}{x-1} + \frac{C}{(x+2)^2} + \frac{Dx+E}{x^2+3}$

c) $\frac{A}{x-1} + \frac{B}{(x+2)} + \frac{C}{(x+2)^2} + \frac{D}{x^2+3}$

d) $\frac{A}{x-1} + \frac{B}{(x+2)} + \frac{C}{(x+2)^2} + \frac{Dx+E}{x^2+3}$

e) $\frac{Ax+B}{x-1} + \frac{C}{(x+2)} + \frac{Dx+E}{(x+2)^2} + \frac{F}{x^2+3}$

5 pts 9. Find the limit

$$\lim_{x\to+\infty}[\ln(3+2x)-\ln(x+1)]$$

a) $\ln(2)$

b) 0

c) $-\infty$

d) $\ln(3)$

e) $+\infty$

15 pts 10. Find the derivative of the function $y=(\ln x)^{\sin x}$

a) $(\ln x)^{\sin x}\left(\cos x\ \ln(\ln x)+\dfrac{\sin x}{x\ln x}\right)$

b) $(\ln x)^{\sin x}\left((\cos x\ \ln(\ln x)+\dfrac{\sin x}{\ln x}\right)$

c) $(\ln x)^{\sin x}\ln(\sin x)$

d) $(\ln x)^{\sin x}\ln(\sin x)\cos(x)$

e) $(\ln x)^{\sin x}\ln(\ln x)\cos x$

15 pts 11. Answer the following. Each question is worth 3 points. **Clearly indicate your answer. No partial credit will be given on this page.**

Find $\lim_{x \to 5^+} e^{\frac{x}{5-x}}$.

Differentiate $f(x) = \pi^x$.

Differentiate $f(x) = e^{x^2+3}$.

Find $\lim_{x \to -\infty} \tan^{-1} x$.

Fully simplify $4^{\log_2 3 + \log_2 5}$.

12 pts 12. Evaluate the integral

$$\int \frac{x^2}{\sqrt{9-x^2}}\,dx.$$

12 pts 13. Find

$$\int \frac{3x^2 - 3x + 1}{x(x^2 + 1)}\, dx.$$

15 pts 14. Evaluate the integral

$$\int \ln(1+x^2)\,dx.$$