UNIVERSITY OF MANITOBA

DATE: October 27, 2006

MIDTERM
TITLE PAGE

DEPARTMENT & COURSE NO: MATH 1500
EXAMINATION: Intro Calculus

TIME: 1 hour
EXAMINER: Various

NAME: (Print in ink) _____

STUDENT NUMBER: _____

SIGNATURE: (in ink) _____
(I understand that cheating is a serious offense)

Please indicate your instructor and section by checking the appropriate box below:

☐	A01	slot 3,5T	MWF -10-30 and T - 10:00	P. Penner
☐	A02	slot 2	MWF-9:30	A. Gerhard
☐	A03	slot 5	T,Th-10:00	C. K. Gupta
☐	A04	slot 6	MWF-11:30	W. Korytowski
☐	A05	slot 7	MWF-12:30	P.N. Shivakumar
☐	A06	slot 12	MWF-3:30	M. Young
☐	A07	E2	Tu 7:00	J. Sichler
☐	A91	Challenge for Credit	☐ Dakota ☐ Sisler	

INSTRUCTIONS TO STUDENTS:

This is a 1 hour exam. **Please show your work clearly.**

No texts, notes, or other aids are permitted. Calculators, cellphones or electronic translators are also not permitted.

This exam has a title page, 5 pages of questions and also 1 blank page for rough work. Please check that you have all the pages. You may remove the blank page if you want, but do not remove the staple.

The value of each question is indicated in the lefthand margin beside the statement of the question. The total value of all questions is 60 points.

Answer all questions on the exam paper in the space provided beneath the question. If you need more room, you may continue your work on the reverse side of the page, but CLEARLY INDICATE that your work is continued.

Question	Points	Score
1	10	
2	15	
3	8	
4	3	
5	7	
6	7	
7	4	
8	6	
Total:	60	

UNIVERSITY OF MANITOBA

DATE: October 27, 2006

MIDTERM

DEPARTMENT & COURSE NO: MATH 1500

TIME: 1 hour

EXAMINATION: Intro Calculus

EXAMINER: Various

---

[10] 1. Evaluate the following limits. If the limit does not exist or is $\pm\infty$ indicate that.

(a) $\lim_{x\to 4} \frac{x^2-16}{x^2-4x}$

(b) $\lim_{x\to 3^-} \frac{x^2+9}{x^2-9}$

(c) $\lim_{x\to 0} \frac{x}{\sqrt{x+1}-1}$

[15] 2. Find the derivative $f'(x)$ in each case. DO NOT SIMPLIFY your answers.

(a) $f(x) = 2\sqrt{x} + \frac{5}{x^5} + \pi^2$

(b) $f(x) = x^2 \cos x$

(c) $f(x) = \frac{x^2}{\tan(3x)}$

(d) $f(x) = \sin^2(\sqrt{x^2+1})$

[8] 3. Let

$$f(x) = \begin{cases} \sqrt{x^2+1} & \text{if } x > 0; \\ x^2+1 & \text{if } x < 0; \\ 2 & \text{if } x = 0. \end{cases}$$

Does $\lim_{x \to 0} f(x)$ exist? If so what is its value? Is the function continuous at $x = 0$? You MUST justify you answers to receive full marks.

[3] 4. Prove that $(\sin x)' = \cos x$.

You may assume the trigonometric identity $\sin(a+b) = \sin a \cos b + \cos a \sin b$ and the two limits $\lim_{h \to 0} \frac{\sin h}{h} = 1$ and $\lim_{h \to 0} \frac{\cos h - 1}{h} = 0$.

[7] 5. Let y be a function of x which satisfies the equation $y \sin x = x^3 + \cos y$. Find y'.

[7] 6. Use only the definition of the derivative to find $f'(x)$ if $f(x) = \dfrac{1}{x^2+1}$.

[4] 7. A line is tangent to the curve $y = x^2 + 2x - 1$ when $x = 0$. Find where this line intersects the x-axis.

[6] 8. The length and width of a rectangle are changing but the area remains fixed at 10 cm^2. If the length is increasing at 3 cm per minute when it is 5 cm long, how fast is the width changing at that time?