THE UNIVERSITY OF MANITOBA

October 26, 2007 — MIDTERM EXAMINATION

TITLE PAGE

DEPARTMENT & COURSE NO: MATH 1700 — TIME: 5:30 – 6:30 PM

EXAMINATION: Calculus 2 — EXAMINER: Various

FAMILY NAME: (Print in ink) _____

GIVEN NAME: (Print in ink) _____

STUDENT NUMBER: (Print in ink) _____

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

Please mark your section number

- ☐ A01 MWF (8:30 – 9:20) S. Kalajdzievski
- ☐ A02 T & R (1:00 – 2:15) W. Korytowski

INSTRUCTIONS TO STUDENTS:

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

No calculators, texts, notes, cell phones, translators or other aids are permitted.

This exam has a title page, 5 pages of questions and 1 blank page at the end for rough work. Please check that you have all the pages.

The value of each question is indicated in the left-hand margin beside the statement of the question. The total value of all questions is 60.

Answer all questions on the exam paper in the space provide 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.

DO NOT WRITE IN THIS COLUMN
1. _____ /16
2. _____ /12
3. _____ / 4
4. _____ / 4
5. _____ / 5
6. _____ / 8
7. _____ /11
TOTAL _____ /60

Values

[16] 1. Find each limit, if it exists.

(a) $\lim_{x\to 1}\dfrac{1-x+\ln x}{x^3-3x+2}$

(b) $\lim_{x\to 0}\left(1+\sin(\pi x)\right)^{\frac{1}{x}}$

Values

[12] 2. Evaluate

(*a*) $\int x(2x-1)^{20}\,dx$

(*b*) $\int e^{\cos x}\sin x\,dx$

[4] 3. (a) Use the definition of a definite integral to write $\lim_{n\to\infty}\sum_{i=1}^{n}\frac{1}{n}\left[1+\left(\frac{i}{n}\right)^3\right]$ as a definite integral.

(b) Use your answer in part (a) to find the value of the limit $\lim_{n\to\infty}\sum_{i=1}^{n}\frac{1}{n}\left[1+\left(\frac{i}{n}\right)^3\right]$.

[4] 4. Sketch the curve $r=3\sin(2\theta)$. State the polar coordinates, (r,θ), of at least three points on this graph.

Values

[5] 5. Write the integral which represents the area of the region that lies inside the curve $r = 4\cos\theta$ and above the line $\theta = \frac{\pi}{4}$.

Draw a rough sketch of the above two curves on the same coordinate system.
DO NOT EVALUATE THE INTEGRAL

[8] 6. Find the area of the region bounded by the curves $y = x^2$ and $x = y^2$.
[Draw a rough sketch of the above two curves on the same coordinate system.]

Values

[11] 7. Write an integral which represents each volume.

(a) The volume of the solid obtained when the region bounded by the curve $y = \sin x$ with $0 \le x \le \pi$, and the x-axis is rotated about the y-axis.
DO NOT EVALUATE THIS INTEGRAL.

(b) The volume of the solid obtained when the region enclosed by $y = x^2$ and $y = 2 - x^2$ is revolved about the x-axis.
DO NOT EVALUATE THIS INTEGRAL.