

UNIVERSITY OF MANITOBA

DATE: Wednesday, April 16th, 2014

FINAL EXAM

TITLE PAGE

DEPARTMENT & COURSE NO: MATH 1700-D01

TIME: 2 hours

EXAMINATION: Calculus II

EXAMINER: M. Virgilio

SURNAME: (Print) _____

GIVEN NAME(S): _____

STUDENT NUMBER: _____

SIGNATURE: _____

(I understand that cheating is a serious offense)

INSTRUCTIONS TO STUDENTS:

This is a 2 hour exam. **Please show your work clearly.**

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

This exam has a title page, 11 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 be careful not to loosen the staple.

The value of each question is indicated to the right of the question. The total value of all questions is 100 points.

Questions	Points	Score
1	8	
2	8	
3	50	
4	7	
5	12	
6	15	
Total:	100	

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.

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1.

Evaluate $\lim_{x \rightarrow -\infty} \left(1 - \frac{3}{x}\right)^{2x}$

8 Marks

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2.

Show that the improper integral $\int_0^2 \frac{dx}{(1-x)^2}$ converges and find its value, or show that it diverges.

8 Marks

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3.

Solve the following integrals:

(a) $\int x^2(3-x)^5 dx$

8 Marks

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(b) $\int_{1/3}^e 3(\ln 3x)^2 dx$

10 Marks

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(c) $\int \cos^3 x \sin^4 x dx$

8 Marks

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(d) $\int \frac{x^2}{(1-9x^2)^{3/2}} dx.$

12 Marks

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(e) $\int \frac{2x^3 + 10x}{(x^2 + 1)^2} dx.$

12 Marks

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4.

Find the length of the curve defined by $(y + 1)^2 = 4x^3$ between the points $(0, -1)$ and $(1, 1)$.

7 Marks

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5.

For each of the following region, give a rough sketch of the region described, and set up a definite integral (or combination of definite integrals) to find the area of the region. **DO NOT SOLVE THE DEFINITE INTEGRALS.**

(a) The region between the curves $y = |4x - 1|$ and $y = x^2 - 5$, $x = 0$, $x = 4$.

6 Marks

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(b) The region (described in polar coordinates) inside the circle $r = 6 \cos \theta$ and outside the cardioid $r = 2(1 + \cos \theta)$. **6 Marks**

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6.

Set up **BUT DO NOT SOLVE** the integrals which give the volume of solid obtained by rotating the region bounded by $y = 4 - x^2$, the x -axis and the y -axis:

- (a) about the x -axis. **5 Marks**
- (b) about the y -axis. **5 Marks**
- (c) about the line $x = -2$. **5 Marks**

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