Arts & Science MATH 116 CALCULUS II

Midterm 1 (50 marks available)

Feburary 11, 2015

Put a check mark to indicate your LECTURE SECTION and INSTRUCTOR:

_____ 02 John Martin

_____ 04 Qinde Yang

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OLD EXAM

Please ***print*** your names and IDs in ***ink***:

Family Name: _____ **First Name**: _____

Student ID: _____

NSID: _____

INSTRUCTIONS

1. Time Limit: **80 minutes**
2. **Closed book. Closed notes. No calculators**.
3. Write clearly and legibly.
4. **Simplify answers** unless otherwise instructed.
5. All answers to be marked are to be written inside this booklet only including rough work. Students are not allowed to use their own scrap paper.
6. Work lacking enough details may not be credited.
7. Check that you have **14 printed pages**. Pages 3, 6, 11 and much of page 14 may be used for doing rough work.
8. Numbers that are enclosed in square brackets, [ ], indicate the number of marks allotted for that question.

[2] 1. Evaluate the sum: $\sum_{i=3}^{100} \left[2^i - 2^{i-1} \right]$

[5] 2. Use the ***definition*** of the definite integral as *a limit of a Riemann sum* to evaluate the area under the graph of $f(x) = x^2 + 1$ in the first quadrant between $x = 1$ and $x = 3$. Here are some useful summation formulae:

$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}, \qquad \sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}, \qquad \sum_{i=1}^{n} i^3 = \frac{n^2 (n+1)^2}{4}.$$

This page may be used for scratch work. If you use this page to answer a question, please clearly indicate on the original question page that you are doing so, and indicate here which question you are answering.

[4] 3. Find the derivative $F'(x)$ if $F(x) = \int_{x^2}^{1} \sqrt{1+\sin t}\ dt$.

[4] 4. The velocity function (in meters per second) for a particle moving along a straight line is given by $v(t) = 1 - \sqrt{t}$. Find the **distance travelled** in the time interval $0 \le t \le 4$.

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5. Evalutate the integrals:

[5] (a) $\int_0^{13} \frac{1}{\sqrt[3]{(2x+1)^2}}\,dx$

[5] (b) $\int_0^3 x\sqrt{x+1}\,dx$

5. (… continued)

[4] (c) $\int \frac{e^{2\tan x}}{\cos^2 x}\,dx$

[4] (d) $\int \frac{1}{(x^2+1)\,\tan^{-1} x}\,dx$

[4] 6. Find the area of the region R bounded by the curves $y = \sqrt{x-1}$ and $x - y = 1$.

[4] 7. Find the volume of the given solid S. The base of S is the region enclosed by the parabola $y = 1 - x^2$ and the x-axis. Cross-sections of S perpendicular to the y-axis are squares.

This page may be used for scratch work. If you use this page to answer a question, please clearly indicate on the original question page that you are doing so, and indicate here which question you are answering.

8. Consider the region R in the plane bounded by the curves $x = y^2 + 1$ and $x = 2$.

[5] (a) Use the ***method of cylindrical shells*** to find the volume of the solid obtained by rotating the region R about the line $y = -2$.

8. (… continued) Consider the same region R in the plane bounded by the curves $x = y^2 + 1$ and $x = 2$ given on page 12.

[4] (b) Use the ***disk/washer method*** to find the volume of the solid obtained by rotating the region R about the line $x = 2$. Set up but do not evaluate the integral.

Much of this page may be used for scratch work. If you use this page to answer a question, please clearly indicate on the original question page that you are doing so, and indicate here which question you are answering.

Markers Use Only:

1	2	3	4	5a	5b	5c	5d	6
7	**8a**	**8b**						

Total (out of 50):