OLD EXAM

2014-2015 Term 2

Arts & Science
MATH 116 CALCULUS II

# Midterm 2

19 March 2015

(50 marks available on this paper)

**Put a check mark to indicate your <u>LECTURE</u> <u>SECTION</u> and <u>INSTRUCTOR</u>:**

______ 02 John Martin

______ 04 Qinde Yang

______ 06 Vahid Anvari

______ 96 Lawrence Chang

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 as well as rough work are to be written inside this booklet. Students are not allowed to use their own scrap paper for doing rough work.

6. Check that you have **14 printed pages.** Pages 6, 9, and much of page 14 may be used for doing rough work.

7. Work lacking enough details may not be credited.

8. Numbers that are enclosed in square brackets, [ ], indicate the number of marks allotted for that question.

Evaluate the integrals in problems #1-7.

[5] 1. $\displaystyle\int \frac{\sin^3 x}{\sqrt{\cos x}}\,dx$

[5] 2. $\int x \tan^2 x \, dx$

[4] 3. $\int_0^{\pi/4} \sqrt{1-\cos 2\theta}\ d\theta$

[5] 4. $\displaystyle\int \frac{1}{x^2\sqrt{x^2-16}}\,dx$

The space on 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.

[5] 5. $\displaystyle\int \frac{e^x}{e^{2x}+4}\,dx$

[5] 6. $\displaystyle\int \frac{x^3}{(x^2+1)^2}\,dx$

The space on 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.

[5] 7. $\displaystyle\int \frac{\sqrt{x}}{1+\sqrt{x}}\,dx$

[5] 8. A spring has a natural length of 2 ft. If a 50 lb force is required to keep it stretched to a length of 5 ft, how much work is required to stretch it from 3 ft to 5 ft ? Assume Hooke's Law.

[4] 9. Find all positive numbers $b$ such that the average value of $f(x) = x^2 - 2x + 5$ on the interval $[0, b]$ is equal to 11.

[7] 10. A tank has the shape of an inverted cone with height 8 ft and with the radius at the top of the tank 4 ft. If it is filled with water to a depth of 4 ft, how much work is required to pump the water to a height of 2 ft above the top of the tank? Use the symbol $\rho$ to stand for the *density* of water measured in $\text{lb/ft}^3$, and leave your answer in terms of $\rho$.

Much of the space on 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.

**Markers Use Only**:

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Total: (out of 50)