MA 16021 Exam 1 Memo
Monday, September 22, 2014 6:30pm in Elliott

1. Exam 1 covers sections 1.6, Ch.3, 5.5-5.7, 7.2, 7.3, 7.6, 8.2, 8.5 (Lessons 0-8)
2. The exam will consist of 12 multiple choice problems. The exam is machine graded, so there will be no partial credit available.
3. Only a one-line scientific calculator is allowed on any exam. No two-line or graphing calculators are allowed.
4. Since the exam will be machine graded, the only thing that will be graded is the scantron answer sheet. You may keep the exam form. Double check what you are turning in to make sure you have the correct section number and exam form reported and bubbled in. We cannot grade anything on your exam form.
5. There are review problems attached to this memo. It is highly recommended that you review old homework assignments for additional review.
6. Please reread the section on the syllabus regarding the exam.
7. You must use your 10 digit Purdue ID number on the exam scantron. Please double check and make sure that you have filled it in correctly, as this is how it gets uploaded to Blackboard.
8. You must bring your Purdue ID to the exam.
9. If you miss the exam, you need to contact the course coordinator immediately (norris@purdue.edu, MATH 810). Do not wait until the next class session to contact the course coordinator.
10. The exam is self-explanatory. Instructors and proctors are not allowed to interpret any of the questions for any student.
11. Any student that does not have a valid, documented reason for missing an exam may still be allowed to sign up for the make-up exam with a grade penalty. Carelessness in knowing the correct time and place of the exam will not be a valid reason for missing the exam.
12. During the exam, no student is permitted to leave before the first 20 minutes of the exam. No student is allowed to come in and take the exam after the first 20 minutes. If a student shows up more than 20 minutes late, they should speak directly with the course coordinator about the possibility of taking the make-up exam. If they do not have a valid and documentable reason, a grade penalty will be implemented on the make-up exam.

Review Problems:

1. Write each expression as a single logarithm.
   (a) $5\ln x + 3\ln y - \ln y^2$
   (b) $5 - 3\ln(x-2) + 7 - \frac{1}{3}\ln(x^2+1)$
   (c) $\frac{1}{2}\ln x + 2\ln(x+5) - 3$
2. Write each expression as a sum, difference, or multiple of logarithms.
   (a) $\ln\left(3e^{-4x}\right)$
   (b) $\ln\left(\dfrac{\sqrt{x}}{(x+2)^3}\right)$
   (c) $\ln\left[\left(e^3 - e^{-3}\right)^2\right]$

3. Differentiate each of the given functions.

   (a) $y = x \ln 5x$

   (b) $y = e^{\cos 5x}$

   (c) $y = 2 \ln(\sin 4x)$

   (d) $y = \tan(\ln 2x)$

   (e) $y = \sin^2(e^{\sec 4x})$

4. Evaluate the integral.

   (a) $\int \sec^2 5x dx$

   (b) $\int x^2 e^{-x^3} dx$

   (c) $\int \frac{x}{(x^2-4)^2} dx$

   (d) $\int \frac{e^{4x}}{1-e^{4x}} dx$

   (e) $\int \cos 3x \sin^3 3x dx$

   (f) $\int 2x \cos 4x dx$

   (g) $\int x^2 \ln 7x dx$

   (h) $\int 5x e^{-7x} dx$

   (i) $\int x^2 \sin 5x dx$

   (j) $\int \frac{x^3}{x+2} dx$

   (k) $\int \frac{2-x}{x(x+1)} dx$

   (l) $\int \frac{3x-16}{x^2+x-6} dx$

5. Use the disk/washer method to find the volume of the solid generated by revolving the defined region about the given axis.

   (a) $y = 2x, x = 1, x = 4$, about x-axis

   (b) $y = x^3, y = x, x \geq 0$, about x-axis

   (c) $y = 2x, y = 4, x = 0$,about y-axis

6. Use the method of cylindrical shells to find the volume of the solid generate by revolving the defined region about the given axis.

   (a) $y = x, x = 3$, about x-axis

   (b) $y = 2x, y = 3 - x$, about y-axis

   (c) $y = x^2 - 2x, y = 0$, about y-axis

7. Find the centroid of each region bounded by the given curves.

   (a) $x + y = 1, x = 0, y = 0$

   (b) $y = x, y = 2, x = 0$

   (c) $y = x^2 - 2x, y = 0$

   (d) $y = 2x, y = x^2$

Answers to Review Problems:

1. (a) $\ln\left(x^5 y\right)$ (b) $\ln\left(\dfrac{e^{12}}{(x-2)^3\sqrt[3]{x^2+1}}\right)$ (c) $\ln\left(\dfrac{\sqrt{x}\,(x+5)^2}{e^3}\right)$
2. (a) $\ln 3 - 4x$ (b) $\dfrac{1}{2}\ln x - 3\ln(x+2)$ (c) $2\ln(e^3 - e^{-3})$
3. (a) $\ln 5x + 1$ (b) $-5e^{\cos 5x}\sin 5x$ (c) $8\cot 4x$
   (d) $\dfrac{\sec^2(\ln 2x)}{x}$ (e) $8e^{\sec 4x}\sin\left(e^{\sec 4x}\right)\cos e^{\sec 4x}\sec 4x\tan 4x$
4. (a) $\frac{1}{5}\tan 5x + C$ (b) $-\frac{1}{3}e^{-x^3} + C$ (c) $-\dfrac{1}{2(x^2-4)} + C$
   (d) $-\frac{1}{4}\ln\left|1 - e^{4x}\right| + C$ (e) $\frac{1}{12}\sin^4 3x + C$ (f) $\frac{1}{2}x\sin 4x + \frac{1}{8}\cos 4x + C$
   (g) $\dfrac{1}{3}x^3\ln 7x - \dfrac{1}{9}x^3 + C$ (h) $-\dfrac{5}{49}e^{-7x}(7x+1) + C$ (i) $\frac{2}{125}\cos 5x + \frac{2}{25}x\sin 5x - \frac{1}{5}x^2\cos 5x + C$
   (j) $\dfrac{1}{3}x^3 - x^2 + 4x - 8\ln(x+2) + C$ (k) $2\ln x - 3\ln(x+1) + C$
   (l) $5\ln(x+3) - 2\ln(x-2) + C$
5. (a) 84π (b) $\dfrac{4\pi}{21}$ (c) $\dfrac{32\pi}{3}$
6. (a) 18π (b) 3π (c) $\dfrac{8\pi}{3}$
7. (a) $\left(\frac{1}{3}, \frac{1}{3}\right)$ (b) $\left(\frac{2}{3}, \frac{4}{3}\right)$ (c) $\left(1, -\frac{2}{5}\right)$
   (d) $\left(1, \frac{8}{5}\right)$