Midterm 1 Study Guide

February 16, 2007

Disclaimer: This is intended to be a study guide for important concepts that will be covered on the exam. It is not a comprehensive list of all types of problems on the exam. ALL webwork and book problems assigned, as well as quiz problems are fair game for the exam.

1. Compute the following integrals by substitution.

   (a) $\int x^2 \cos(x^3)dx$

   (b) $\int xe^{x^2}dx$

   (c) $\int \frac{x}{1+x^2}dx$

   (d) $\int \frac{e^x}{1+e^{2x}}dx$

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

2. Compute the following indefinite integrals by parts.

   (a) $\int 5x \cos(x)dx$

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

   (c) $\int x^4 \ln(x)dx$

   (d) $\int x^4 (\ln(x))^2 dx$

   (e) $\int \sin(x)e^{3x}dx$

   (f) $\int \ln(x)dx$

3. Compute the following definite integrals by substitution.

   (a) $\int_0^{\pi/2} x \sin(x^2)dx$

   (b) $\int_1^2 \frac{x^2}{5+x^3}dx$

4. Compute the following definite integrals by parts.

   (a) $\int_0^1 x \sin(x)dx$

   (b) $\int_{-\pi}^{\pi} x^2 \cos(x)dx$

(c) $\int_1^2 x^4 \ln(x) dx$

5. Compute the following indefinite integral by using parts first, then substitution.

   $\int \arctan(x) dx$

6. Compute the following indefinite integral by substituting first, then using parts.

   $\int x^3 \cos(x^2) dx$

7. Find the area bounded by the curves $y = x$ and $y = x^2$.

8. Find the area bounded by the curves $y = \sin(x)$, $y = \cos(x)$, $x = 0$, and $x = \pi/2$.