Announcements

- This week: Final Exam Review
- Homework #10A & 10B Due Wednesday, December 7. 11:00pm
- Bring ReviewOne.pdf and ReviewTwo.pdf to your TA sections this week
- Course evaluations are now open. Your input really matters!
  - MATH 125 A: https://uw.iasystem.org/survey/165334
  - MATH 125 B: https://uw.iasystem.org/survey/165324
- Final Exam: Saturday, December 10 from 1:30 – 4:20 pm (Bring your student ID)
    - ★ Rooms: 125 A in KNE 110 and 125 B in KNE 210
  - Cumulative Exam: Covers all material
  - The only calculator allowed is the Ti-30x IIS.
  - Allowed one 8.5 x 11 sheet of notes (both sides)
  - May use the 20 integrals on p. 495 without deriving them. Show your work in evaluating any other integrals, even if on your note sheet.
  - Do sample Finals: Math 125 Materials page and our webpage

Today

- Final Exam Review - Overview of Topics & Old Final Exam Problems

Topics to review

- Antiderivatives
- Areas and distances, Riemann sums, definite integrals and the fundamental theorem of calculus, parts I and II
- Indefinite integrals, net change theorem
- Techniques of integration:
  - Substitution rule
  - Integration by parts
  - Trigonometric substitution (trigonometric integrals)
  - Partial fractions (includes long division of polynomials)
  - Rationalizing substitutions
- Approximate integration: Midpoint, Trapezoid, and Simpson's rule
- Improper integrals (includes l'Hospital's rule): Infinite intervals, discontinuous functions

- Applications of integration
  - Area between curves (includes graphing functions)
  - Volumes (cross section and shell methods)
  - Work
  - Average value of a function
  - Arc length
  - Moments and centers of mass
- Differential equations (modeling and solving)

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Problem 1. Evaluate the following integrals.

- $\int_0^2 x^3 e^{x^2}\, dx$
- $\int \frac{\cos x}{\sin x} \ln(\sin x)\, dx$
- $\int x(x+1)^{2005}\, dx$
- $\int \frac{dx}{\sqrt{x^2 - 2x - 3}}$
- $\int \frac{x^4 + 4}{x^3 + 2x^2}\, dx$

Winter 2015, Problem 4 (highly requested problem).

A region is bounded on the top by the curve $y = \sqrt{6 + \cos(x)}$ and on the bottom by the x-axis. On the left it is bounded by a vertical barrier which at a given instant is at $x = -\pi$ and is moving to the left at α units/sec. On the right it is bounded by a vertical barrier which at that instant is at $x = \pi$ and is moving to the right at β units/sec. Find the instantaneous rate (in units^2/sec) at which area is being uncovered at that instant. Your answer should involve α and β.