# Math 107-Lecture 9

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# Announcements

- Exam 1 is tonight: Wednesday, 6:30-8:00 pm; rooms announced in email and on Canvas. All details for alternate exam have been sent to students.
- Today we will review the material for the exam (less emphasis on 7.6 and 7.7 which we covered last time).

# Review topics

- Methods of integration:
  1. substitution
  2. integration by parts
  3. partial fractions
  4. trigonometric substitutions.
- Numerical integration
- Improper integral and comparison tests.

# Clicker question #1

Evaluate

$$\int \frac{2x^2 - x + 4}{x^3 + 4x}\, dx$$

- $(2x^2 - x + 4)\ln|x^3 + 4x| + C$
- $\frac{x}{x^2+4} + \frac{3-x}{x} + C$
- $\ln|x| + 2\ln(x^2 + 4) + C$
- $\ln|x| + \frac{1}{2}\ln(x^2 + 4) - \frac{1}{2}\arctan(\frac{x}{2}) + C$
- we can't integrate the above expression

# Numerical integration

Example: Use a left Riemann sum, the trapezoidal, and the midpoint rules to estimate:

$$\int_0^{2\sqrt{\pi}} \sin(2x^2)\, dx$$

with $n = 4$.

# Clicker question #2

For $\int_0^3 e^{x^4}\,dx$ decide which of the inequalities below is correct, where:

- $V =$ the exact value of the integral
- $T =$ the trapezoidal approximation for $n = 10$
- $M =$ the midpoint approximation for $n = 10$
- $L =$ the left Riemann sum for $n = 10$,

(Hint: do not compute the values, but use the behavior of the function)

- $V < T$
- $V < M$
- $V < L$
- $T < L$
- $T < M$

# Integration problems:

Evaluate

1. $\displaystyle\int \frac{x}{\sqrt{3-2x-x^2}}\,dx$
2. $\displaystyle\int \frac{x}{5+2x+x^2}\,dx$
3. $\displaystyle\int_0^4 \sqrt{2x+1}\,dx$
4. $\displaystyle\int_0^{\pi} (x+1)^2 \sin(x)\,dx$
5. $\displaystyle\int_0^1 \frac{(1+y)^3}{\sqrt{(1-y)^3}}\,dy$

# Wrapping up:

- Today we reviewed the material that was covered from Chapter 7.
- Exam 1 is tonight (Wednesday) 6:30–8:00 pm.
- Next time we will cover Section 8.1 (areas and volumes).