This quiz covers everything done in class on February 16, 18, and 20 and the types of homework problems assigned on those days.

Reminder: The quiz is on Wednesday February 25. There will be an optional review session on Tuesday February 24 at 1pm in Bailey 207.

Note: Some integrals on this quiz may be integrals by substitution, or integrals on or close to the Basic Integral List. This checks your ability to choose an appropriate method of integration from the ones available, and helps you to prepare for Test 2.

• Integration by Parts
  - Formula: $\int u \, dv = uv - \int v \, du$
  - Useful for integrating products, natural logs and inverse trig functions.

A. Easier (one-stage) examples
   - $u$ and $v$ should be chosen so that $\int v \, du$ is easier to compute than $\int u \, dv$.

B. Derivation/explanation of the formula

C. Harder examples
   - Multi-stage problems
   - Integrals that don’t appear to involve a product (take $dv = dx$)

• Integration by Partial Fractions
  - Applies to $\int \frac{P(x)}{Q(x)} \, dx$ where $P(x)$ and $Q(x)$ are polynomials.
  - Procedure
    1. Check if $\deg P(x) < \deg Q(x)$. If not, divide denominator into numerator using long division of polynomials.
    2. Factor the denominator completely.
    3. Set up an appropriate decomposition form.
    4. Evaluate the constants.
    5. Integrate, using

\[
\begin{align*}
  \int \frac{1}{x-a} \, dx &= \ln |x-a| + C \\
  \int \frac{1}{(x-a)^2} \, dx &= -\left(\frac{1}{x-a}\right) + C \\
  \text{etc.}
\end{align*}
\]