Outline for Quiz 6

This quiz covers everything done in class on February 23 and 25, and the types of homework problems assigned on those days.

Reminder: The quiz is on Monday March 2. There will be an optional review session on Sunday March 1 at 2:30pm in Bailey 207.

• Integration by trig substitution

  A. Turns certain sums and differences into perfect squares.

<table>
<thead>
<tr>
<th>If the integrand contains:</th>
<th>Try substituting:</th>
<th>Use the identity</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a^2 - x^2$</td>
<td>$x = a \sin \theta$</td>
<td>$1 - \sin^2 \theta = \cos^2 \theta$</td>
</tr>
<tr>
<td>$a^2 + x^2$</td>
<td>$x = a \tan \theta$</td>
<td>$\tan^2 \theta + 1 = \sec^2 \theta$</td>
</tr>
<tr>
<td>$x^2 - a^2$</td>
<td>$x = a \sec \theta$</td>
<td>$\sec^2 \theta - 1 = \tan^2 \theta$</td>
</tr>
</tbody>
</table>

B. Procedure:
  – Pick an appropriate substitution for $x$ and calculate $dx$.
  – Substitute $x$ and $dx$ into the integral and simplify using the trig identities.
  – Evaluate the resulting trigonometric integral.
  – Undo the substitution using right triangles.

C. Things to think about in the integration step
  – is the trigonometric integral on the Basic Integral List or on the list of provided integrals?
  – can a $u$-substitution do the trick?
  – how about manipulating the integral (e.g., turn trig functions into sin and cos and simplify)?
  – (once the antiderivative is found) if the antiderivative contains $\theta$: use an inverse trig function to get $\theta$ in terms of $x$. 