All of today’s material will be tested without calculators. To prepare for this, you should work all of the WebAssign problems without a calculator or any other machine assistance. This lesson is trig intensive. You will need to use some trig identities.

Everyone must know one trig identity from memory:

\[
\sin^2 x + \cos^2 x = 1
\]

For this assignment all other identities are provided as needed.

1. Many integrals involving sines and cosines are solvable by a simple substitution of \( u = \sin x \) or \( u = \cos x \). Sometimes these also require a simple trig identity.

Khan Academy has [a good video].

2. There is one clear exception which cannot be done with substitution: even powers of sine or cosine. You have to change the problem with a half-angle identity

\[
\sin^2 x = \frac{1}{2} - \frac{1}{2} \cos(2x)
\]

\[
\cos^2 x = \frac{1}{2} + \frac{1}{2} \cos(2x)
\]

In most examples this converts the problem to an elementary antiderivative.

This and item 1 are covered in Section 7.2 of your textbook.

3. There is a new kind of substitution, typically applied to integrals including \( \sqrt{1-x^2} \), or things like it. The substitution is

\[
x = \sin u
\]

and also requires the fact that

\[
\sqrt{1-x^2} = \cos u
\]

Here is a [Khan Academy video].

This is covered in Section 7.3 of your textbook.

4. There are additional variations on all three of these themes in the second part of the assignment. These may be a bit more involved. You may want to explore some of the other videos at the Khan Academy links above.