LAST OF 3.2 TRIG INTEGRALS AND 3.3 TRIG SUBSTITUTION

1. Trigonometric Identities (Fill in the set of Pythagorean Identities.)

Half-Angle/Double Angle	Sum and Difference
$\sin^2(x) = \frac{1}{2}(1 - \cos(2x))$	$\sin(ax)\cos(bx) = \frac{1}{2}(\sin((a-b)x) + \sin((a+b)x))$
$\cos^2(x) = \frac{1}{2}(1 + \cos(2x))$	$\sin(ax)\sin(bx) = \frac{1}{2}(\cos((a-b)x) - \cos((a+b)x))$
$\sin(2x) = 2\sin(x)\cos(x)$	$\cos(ax)\cos(bx) = \frac{1}{2}(\cos((a-b)x) + \cos((a+b)x))$

Pythagorean

2. Compare the following three integrals. Which integration strategy works on which one?

   (a) $\int \cos(x)\, dx$ (b) $\int \cos^2(x)\, dx$ (c) $\int \cos^3(x)\, dx$

Section 3.3

3. Compare the following three integrals. Which ones can a Calculus I student integrate?

(a) $\displaystyle\int \frac{1}{\sqrt{9-x^2}}\,dx$ (b) $\displaystyle\int \frac{x}{\sqrt{9-x^2}}\,dx$ (c) $\displaystyle\int \frac{x^2}{\sqrt{9-x^2}}\,dx$

4. Summary: If $\sqrt{a^2-x^2}$ appears in an integrand (**and** other techniques do not work), then

5. Compare the following integrals. Which one can a Calculus I student integrate?

   (a) $\displaystyle\int \frac{dx}{9+x^2}$ (b) $\displaystyle\int \frac{dx}{\sqrt{9+x^2}}$ (c) $\displaystyle\int \frac{dx}{\sqrt{x^2-9}}\,dx$

6. Summary:

   - If $\sqrt{a^2+x^2}$ appears in an integrand (**and** other techniques do not work), then

   - If $\sqrt{x^2-a^2}$ appears in an integrand (**and** other techniques do not work), then

7. Evaluate

   (a) $\displaystyle\int \frac{dx}{(4+x^2)^2}$

   (b) $\displaystyle\int \frac{dx}{(x^2-9)^{3/2}}$