Math 152 Week In Review: Sections 7.3

Solutions and questions can be found at the link:
https://www.math.tamu.edu/~kahlig/152WIR.html

$$\int \sec x \; dx = \ln|\sec x + \tan x| + C \qquad \int \sec^3 x \; dx = \frac{1}{2} \sec x \tan x + \frac{1}{2} \ln|\sec x + \tan x| + C$$

$$\int \csc x \; dx = \ln|\csc x - \cot x| + C \qquad \int \csc^3 x \; dx = \frac{-1}{2} \csc x \cot x + \frac{1}{2} \ln|\csc x - \cot x| + C$$

Expression	Substitution	Identity
$\sqrt{a^2 - x^2}$	$x = a\sin\theta, \; \frac{-\pi}{2} \le \theta \le \frac{\pi}{2}$	$1 - \sin^2\theta = \cos^2\theta$
$\sqrt{a^2 + x^2}$	$x = a\tan\theta, \; \frac{-\pi}{2} < \theta < \frac{\pi}{2}$	$1 + \tan^2\theta = \sec^2\theta$
$\sqrt{x^2 - a^2}$	$x = a\sec\theta, \; 0 \le \theta < \frac{\pi}{2} \text{ or } \pi \le \theta < \frac{3\pi}{2}$	$\sec^2\theta - 1 = \tan^2\theta$

1. $\displaystyle \int \frac{x^3}{\sqrt{9 - x^2}} \; dx =$

$$\cos^2\theta = 1 - \sin^2\theta$$

$$\sec^2\theta = 1 + \tan^2\theta$$

$$\tan^2\theta = \sec^2\theta - 1$$

2. $\displaystyle\int \frac{\sqrt{4x^2 - 25}}{x^4}\, dx =$

$\cos^2 \theta = 1 - \sin^2 \theta$

$\sec^2 \theta = 1 + \tan^2 \theta$

$\tan^2 \theta = \sec^2 \theta - 1$

3. $\displaystyle\int \frac{x^3}{\sqrt{x^2+25}}\,dx =$

$\cos^2\theta = 1 - \sin^2\theta$

$\sec^2\theta = 1 + \tan^2\theta$

$\tan^2\theta = \sec^2\theta - 1$

4. $\int \dfrac{1}{(1+x^2)^2}\, dx =$

$$\cos^2 \theta = 1 - \sin^2 \theta$$

$$\sec^2 \theta = 1 + \tan^2 \theta$$

$$\tan^2 \theta = \sec^2 \theta - 1$$

5. $\displaystyle\int \frac{x^2}{(4 - 9x^2)^{3/2}}\, dx =$

$\cos^2\theta = 1 - \sin^2\theta$

$\sec^2\theta = 1 + \tan^2\theta$

$\tan^2\theta = \sec^2\theta - 1$

6. Complete the square for $\quad x^2 + 8x + 3$

7. complete the square for $\quad 5x^2 - 40x + 4$

8. $\displaystyle\int \frac{1}{\sqrt{x^2 + 2x + 10}}\ dx$

$\cos^2\theta = 1 - \sin^2\theta$

$\sec^2\theta = 1 + \tan^2\theta$

$\tan^2\theta = \sec^2\theta - 1$

9. $\displaystyle\int \frac{1}{(x+3)^2\sqrt{x^2+6x+5}}\,dx =$

$\cos^2\theta = 1 - \sin^2\theta$

$\sec^2\theta = 1 + \tan^2\theta$

$\tan^2\theta = \sec^2\theta - 1$