Worksheet 6

Trig & UV Substitution

USEFUL FORMULAS FOR TRIG SUB

$\sin^2\theta = 1 - \cos^2\theta$	for	$\sqrt{a^2 - x^2}$
$1 + \tan^2\theta = \sec^2\theta$	for	$\sqrt{x^2 + a^2}$
$\sec^2\theta - 1 = \tan^2\theta$	for	$\sqrt{x^2 - a^2}$
SOH CAH TOA	for	$\sin(\arccos x)$ $\cos(\arcsin x)$ etc…
$\sin(2\theta) = 2\sin\theta\cos\theta$	for	$\sin(2\arccos x)$ $\sin(2\arctan x)$ etc…
Completing the Square	for	anything math related

USEFUL FORMULAS FOR UV SUB

$$U(t) = \frac{1}{2}\left(t + \frac{1}{t}\right) \qquad V(t) = \frac{1}{2}\left(t - \frac{1}{t}\right)$$

$$t = U(t) + V(t) \qquad \frac{1}{t} = U(t) - V(t)$$

$1 + V^2(t) = U^2(t)$	for	$\sqrt{x^2 + a^2}$
$U^2(t) - 1 = V^2(t)$	for	$\sqrt{x^2 - a^2}$

USING TRIG-SUB

1. $\int \sqrt{16-x^2}\,dx.$

2. $\int \frac{x^3}{\sqrt{4-x^2}}\,dx$

3. $\int \frac{e^t}{\sqrt{4-e^{2t}}}\,dx$

4. $\int \frac{1}{x^2+2x+5}\,dx$

USING UV-SUB

Concerning UV-Sub, I usually recommend trying an appropriate trig substitution first and if you get a trig integral that you aren't sure how to solve then trying UV-sub.

5. $\int \sqrt{x^2-4}\,dx$

6. $\int \sqrt{4+x^2}\,dx$