

# WORKSHEET XIX

## INTEGRATION OF TRIG FUNCTIONS

1. Integrate each of the following functions of sine  $x$  and cosine  $x$ :

(a)  $\sin^2 4x$

(b)  $\sin^3 x$

(c)  $(\sin^2 x)(\cos^9 x)$

(d)  $(\sin^3 x)\sqrt{1+\cos x}$

(e)  $\sin^4 3x$

(f)  $\cos^5 x$

2. Integrate each of the following functions of secant  $x$  and tangent  $x$ :

(a)  $\sec(4x)$

(b)  $\sec^2 x$

(c)  $\tan^2 x$

(d)  $(\tan x)(\sec^2 x)$

(e)  $(\tan x)(\sec^4 x)$

(f)  $(\tan^9 x)(\sec^2 x)$

(g)  $(\tan^{10} x)(\sec^4 x)$

(h)  $\sec^3 x$

3. Integrate each of the following functions by completing the square, if necessary.

(a)  $\frac{1}{x^2 + 4x + 5}$

(b)  $\frac{1}{x^2 + 2x + 5}$

(c)  $\frac{1}{(x^2 + 1)^2}$

(d)  $\frac{x}{x^2 + 4x + 11}$

4. By making an appropriate trig (or hyperbolic) substitution, convert each of the following integrals to trig integrals.

(a)  $\int \frac{x}{(x^2 + 1)^3} dx$

(b)  $\int \frac{x^3}{\sqrt{1 - x^2}} dx$

(c)  $\int \frac{x^2}{\sqrt{x^2 - 1}} dx$

$$(d) \int \frac{\sqrt{1-x^2}}{x^2} dx$$

5. Using an appropriate trig identity, evaluate each of the following trigonometric integrals:

$$(a) \int \cos(4x) \sin(8x) dx$$

$$(b) \int \cos(2x) \cos(5x) dx$$

$$(c) \int \sin(5x) \sin(9x) dx$$



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