1. Finding derivatives

a. $f(x) = \arccos \frac{x}{2}$

b. $f(x) = \arctan(\sqrt{x^2-1}) + \operatorname{arcsec} \frac{x}{2}$

c. $f(x) = \ln(x^2+4) + \arcsin(x+3)$

d. $f(x) = \ln(\operatorname{arctan} x)$

2. Evaluating Integrals

a. $\int \frac{dx}{\sqrt{9-x^2}}$

b. $\int \frac{dx}{x \cdot \sqrt{25x^2-2}}$

c. $\int_0^2 \frac{dx}{8+2x^2}$

d. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{2\cos x}{1+\sin^2 x}\, dx$

e. $\int \frac{y}{\sqrt{1-y^4}}\, dy$

f. $\int \frac{dx}{(x+1)\sqrt{x^2+2x}}$

g. $\int \frac{e^{\arcsin x}}{\sqrt{1-x^2}}\, dx$

h. $\int_{\sqrt{2}}^2 \frac{\sec^2(\operatorname{arcsec} x)\, dx}{x \cdot \sqrt{x^2-1}}$

3. Solve the initial value problems

a. $\frac{dy}{dx} = \frac{1}{x^2+1} - 1 \qquad y(0) = 1$

b. $\frac{dy}{dx} = \frac{1}{x \cdot \sqrt{x^2-1}} \qquad x > 1; \quad y(2) = \pi$