1. Find the indefinite integral of:

   a) $f(x) = (x^2 + 1)^2 x$

   b) $g(x) = (x^2 - 1)(x^3 - 3x)^3$

   c) $h(x) = x(x^2 - 1)^{-3}$

2. Find the indefinite integral of:

   a) $h(x) = \tan x \sec^2 x$

   b) $g(x) = \sin^3 x$

   c) $f(x) = \sin(2x)(\cos(2x))^2$

3. $\int x(x^2 + 1)^{-2} dx =$

4. Find the indefinite integrals: $\int \sqrt{x}(x + 1) dx = \int x\sqrt{x + 1} dx =$

5. Find the solution to the differential equation

$$\frac{dy}{dx} = y^2 x^2 + y^2$$

such that $y(1) = 2$.

6. Given

$$\frac{dy}{dx} = x^2\sqrt{y}, \quad y = 4 \quad \text{when} \quad x = 0$$

find y as a function of x.

7. Find y as a function of x, given

$$\frac{dy}{dx} = \frac{\sin x}{y}, \qquad y = 5 \quad \text{when} \quad x = 0.$$

8. Find $f(x)$ given that $f(2) = 1$, $f'(1) = -1$ and $f''(x) = x - x^{-3}$.

9. An automobile is travelling down the road a speed of 100 ft/sec. a) At what constant rate must the automobile decelerate in order to stop in 300 ft.? b) How long does that take?

10. A ball is thrown from ground level so as to just reach the top of a building 150 ft. high. At what initial velocity must the ball be thrown?