1. Find $\frac{dy}{dx}$ of the given functions.

   (a) $y = \sqrt[3]{x} + 7$

   (b) $y = \left(x + \frac{1}{x}\right)^2$
(c) \( y = \frac{1 + 5x^3}{x^3} \)

(d) \( y = \ln^2 x + \ln x^2 \)
(e) $y = e^{2x} \sin x$

(f) $x^3 y + xy^3 = 5$
2. Find $\frac{d^2y}{dx^2}$ (i.e., the second derivative) of

$$y = \tan x.$$
3. The position of a particle is given by the equation $s(t) = \cos t$

   (a) Find the velocity at time $t = 3\pi/4$.

   (b) Find the acceleration at time $t = 3\pi/4$. 
4. Find an equation of the tangent line to the curve given by

\[ f(x) = \frac{1}{x + 1}, \]

at the point \((1, 1/2)\).
5. The volume of a cube is decreasing at a rate of 30 cm$^3$/mi. How fast is the length of an edge decreasing when the length of an edge is 10 cm?

(a) Picture and Parameters. (*Don’t forget the parameters!*)

(b) Known rate(s). (*Write in equation rather then only numbers.*)

(c) Unknown rate to find out.

(d) An equation that relates parameters in (a).

(e) Differentiate the equation in (d) with respect to an appropriate variable.

(f) Find the unknown rate. (*Write the unit also.*)