1. [10 pts. each] Use differentiation rules to find the derivative of each function.

   (a) $h(t) = 3\sqrt[3]{t} - 8t^3 + 9t - 250$

   (b) $g(x) = \dfrac{x^3 + 1}{x^2 - 4}$

   (c) $y = \sin x \tan x$

   (d) $y = \dfrac{2 \sec x}{4 + \sin x}$

2. [10 pts.] Let $f(x) = 2x^3 - 3x^2 - 12x + 4$. Find all points on the graph of f at which the tangent line has slope 60.

3. [10 pts. each] Find the derivative of the function using the Chain Rule.

   (a) $y = (4x - 3x^5)^{16}$

   (b) $y = \cot \sqrt{x}$

   (c) $h(x) = \sin^4(\cos(-8x))$

4. [10 pts.] Use implicit differentiation to find dy/dx, given that

$$x^3 = \frac{x + y}{x - y}.$$

5. [10 pts.] Find an equation of the tangent line to the curve given by

$$xy^{5/2} + x^{3/2}y = 12$$

   at the point $(4, 1)$.

6. [10 pts.] When a circular plate of metal is heated in a kiln, its radius increases at a rate of 0.02 cm/min. At what rate is the plate's area increasing when the radius is 60 cm?

7. [15 pts.] A hot-air balloon is rising vertically above a level, straight highway at a constant rate of 1 ft/sec. At the moment when the balloon is 65 ft above the highway, a bicycle going 17 ft/sec passes under it. How fast is the distance between the bicycle and the balloon increasing 4 seconds later?