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

   (a)  $s(t) = 4\sqrt{t} - \dfrac{1}{4}t^4 + t + 1$

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

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

   (d)  $y = \dfrac{2\cos x}{1 + \sin x}$

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)  $y = \tan\sqrt{x}$

   (c)  $h(x) = \sin^4(\cos 7x)$

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.]  The height of a triangle is decreasing at a rate of 1 cm/min while the area is increasing at a rate of 2 cm²/min. At what rate is the base of the triangle changing when the height is 12 cm and the area is 150 cm²?

7. [10 pts.]  A 13-ft ladder is leaning against a vertical wall when Vladimir begins pulling the foot of the ladder away from the wall at a rate of 0.5 ft/s. How fast is the top of the ladder sliding down the wall when the foot of the ladder is 5 ft from the wall?