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

   (a) $s(\theta) = \dfrac{12}{\theta} - \dfrac{4}{\theta^3} + \dfrac{1}{\theta^4}$

   (b) $f(x) = \dfrac{2 + x^2}{2 - x^3}$

   (c) $g(x) = \csc x \cot x$

   (d) $h(t) = \dfrac{2\tan t}{1 - \sin t}$

2. [10 pts.] Find the tangent lines to the curve $y = x^3 + x$ at the points where the slope is 4.

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

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

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

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

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

   $$x^4 - x^2 y = x + 2y.$$

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.] Two jets at an altitude of 10,000 m are flying at 700 km/h along straight-line courses that cross at right angles. How fast is the distance between the jets decreasing when one jet is 10 km from the intersection point and the other is 14 km from the intersection point?

7. [10 pts.] A spherical balloon is inflated with helium at a rate of 120π cm^3/min. How fast is the balloon's radius increasing when the radius is 5 cm? How fast is the surface area increasing? (The volume of a sphere is $V = \frac{4}{3}\pi r^3$, and the surface area is $S = 4\pi r^2$.)