(1) Break the following functions up, either into the form $f(x)g(x)$ or $f(g(x))$. Then differentiate, using the product, quotient, and/or chain rule.
   (a) $h(x) = (x^2 - 2x)\frac{3-2x^3}{x-1}$
   (b) $h(x) = \sqrt[3]{\frac{x+6}{x^2-3}}$

(2) If $y = 3u + u^{-3}$ and $u = \frac{1}{x}$ then what is $\frac{dy}{dx}$? Use the rule $\frac{dy}{dx} = \frac{dy}{du}\frac{du}{dx}$.

(3) Consider the ellipse $\frac{x^2}{4} + y^2 = 9$. What are the dimensions of the rectangle of maximum area contained in this ellipse?

(4) Find the slope of the tangent line to the graph of $x^2 + y^2 = 9$ at the point $(-\frac{\sqrt{3}}{2}, \frac{\sqrt{3}}{2})$. You can check your answer by knowing this fact about the tangent line of a circle at the point (a, b): it is always perpendicular to the line through the origin and (a, b). That is, the slope you get ought to be the negative reciprocal of $\frac{b}{a}$. Hint: in this case, we are looking for the slope of the tangent line, so we want $\frac{dy}{dx}$. Therefore we should think of x as the variable and y as a function $y(x)$.

(5) Find the tangent line to the graph of $4x^2 + y^2 - 3xy = 2$ at $(1, 2)$. Write your answer in the form $y = mx + b$.

(6) The surface area of a sphere is given by $4\pi r^2$ where r is the radius of the sphere. A performer is blowing a bubble at the rate of 2 millimeters per second, at a time when the surface area of the bubble is 36π millimeters. How fast is the surface area of the bubble changing at that time?

(7) Suppose an ant is crawling along the graph of $x^2 + y^2 - xy = 1$, where x and y are both differentiable functions of the time t the ant has been crawling. Say $x'(-93) = 0$ and $x'(-93) = 1$. Find $y'(-93)$.