1.) Determine $y' = \frac{dy}{dx}$ for each.

   a.) $x^2 - y^2 = 36$

   b.) $\cos(xy^2) = y^3 + x$

   c.) $(x - y)^4 = \tan(xy)$

   d.) $\frac{x^2}{y^3 + 1} = \frac{x - 1}{y + 1}$

   e.) $x\sin y + y\sin x = x + y$

   f.) $\sqrt{1 + \sqrt{1 + \sqrt{1 + y}}} = x^2 + \sec(3y)$

2.) Determine an equation of the line perpendicular to the graph of $(xy^3 + y)^3 = x^2 + 27$ at $x = 0$.

3.) Compute the slope and concavity of the graph of $y^3 + y^2 = xy + 2$ at the point where $y = 1$. Sketch the graph near this point.

4.) Determine an equation with graph passing through the point $(0, 1)$ and satisfying $y' = \frac{1 - 2xy^2}{2x^2y - 1}$.

5.) The following equation represents a "tilted" ellipse. Use implicit differentiation to find the maximum and minimum y-values and maximum and minimum x-values on its graph. Sketch the graph of the ellipse: $2x^2 - xy + y^2 = 42$

6.) A sector of measure $\theta$ radians is removed from a circular piece of paper of radius 6 inches. What remains of the paper is formed into a right circular cone. Find $\theta$ which results in the cone of maximum volume.