An airplane is passing by directly above you 6 miles above the ground at a speed of 550 mi/hr. When the airplane's horizontal distance from you is 3 miles, how fast is your viewing angle to the ground changing in radians/sec?

A cylindrical tank with radius 5 m is being filled with water at a rate of 3 m^3/min. How fast is the height of the water increasing?

Find the two points on the parabola $f(x) = x^2$ such that the tangent line of f passes through the point $(0, -9)$.

Use the definition of a derivative to differentiate $f(x) = \sqrt{1 + x}$.

Use the definition of a derivative to find the slope of the tangent line to the curve $y = x^2 - 2$ at the point $(2, 2)$.

Differentiate $1 + x + x^2 + \sin(x) + \cos(x) + e^x$

Find $\frac{dy}{dx}$:

(a) $y = \frac{x^3 lnx}{x+2}$

(b) $y = 5x^2 + sin^2(cos(4x))$

Find $\frac{d}{dx} \ln \sqrt{\frac{1 - \cos x}{1 + \cos x}}$

Find y' if $x^y = y^x$

Using logarithmic differentiation, find the derivative of the following:

(a) $y = x^{lnx}$

(b) $y = \frac{(x^2+3)^{100} x^{x^2}}{(5x^2-2)^3}$

Given that $f(2) = -2, f'(2) = 6, g(2) = 3$, and $g'(2) = -4$. Find $k'(2)$ if $k(x) = \frac{f(x) - f(x)g(x)}{g(x)}$.

Find the x and y coordinates of the point on the graph of $y = \frac{1}{4}(2x+1)^2$ where the tangent line is parallel to the line $y - 3x = 1$.