

- Find the derivative of each of the following functions.
a. $\cos(xe^x)$, b. $(x^2)^x$ at $x = 1$ c. $\ln(x^3 \sin x^2)$ d. $e^{-2x} \arctan x$
- Solve the polynomial inequality $(9x^2 - 1)(x + 1) \geq 0$
- Solve the rational function inequality

$$\frac{x^2 - 9}{x^2 + x + 1} < 0$$

- Determine an interval where the graph of function defined by the polynomial $p(x) = x^4 - 6x^3 + 12x^2$ is concave up.
- For what value of x is the function $f(x) = \frac{1}{x^2 - 1}$ increasing?
- Find the critical points of $f(x) = x^3 - 3x + 2$.