

- 1). Find the derivative of the function $f(x) = 5(x + 47)^2$
- 2). Determine the minimum and maximum of the function $f(x) = 3x^3 + 15x^2$. Then sketch it.

Find the partial derivatives $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ for the following functions:

- 3). $f(x, y) = 3x + 4y$
- 4). $f(x, y) = xy^3 + x^2y^2$
- 5). $f(x, y) = x^3y + e^x$
- 6). $f(x, y) = xe^{2x+3y}$

- 7). Given the function $J(\mathbf{w})$:

$$J(w_0, w_1) = \frac{1}{2m} \sum_{i=1}^m (w_0 + w_1 \mathbf{x}^{(i)} - y_i)^2$$

Determine $\frac{\partial J(\mathbf{w})}{\partial w_0}$ and $\frac{\partial J(\mathbf{w})}{\partial w_1}$

- 8). Find the derivative of the function $f(x) = \frac{1}{1+e^{-x}}$