In general

Optimal parameters to a model f:

$$\hat{b} = \underset{b \in \mathbb{R}^d}{\arg\min} \sum_{i=1}^{n} \rho_f(X, b),$$

where for least squares regression

$$\rho_f(X,b) = [Y - f(X,b)]^2 \quad \Longrightarrow \quad \frac{\partial \rho_f}{\partial b_j} = 2\,[y_i - f(X,b)] \cdot \frac{\partial f(X,b)}{\partial b_j}.$$

Squared function

Let f be $Q(X,b) = (b_0 + \sum\limits_{j>0} b_j x_j)^2$:

$$\begin{cases} \frac{\partial Q}{\partial b_0} = 2(b_0 + \sum\limits_{j>0} b_j x_j) & = 2\sqrt{Q(X,b)} \\ \frac{\partial Q}{\partial b_{j\neq 0}} = 2(b_0 + \sum\limits_{j>0} b_j x_j) \cdot x_j & = 2\sqrt{Q(X,b)} \cdot x_j \end{cases}$$

Exponential function

Let f be $E(X,b) = b_0 + b_1 \cdot x_1 \cdot e^{b_2 x_2}$:

$$\begin{cases} \frac{\partial E}{\partial b_0} = 1 & = 1 \\ \frac{\partial E}{\partial b_1} = x_1 \cdot e^{b_2 x_2} & = [E(X,b) - b_0]/b_1 \\ \frac{\partial E}{\partial b_2} = x_1 \cdot e^{b_2 x_2} \cdot b_1 \cdot x_2 & = [E(X,b) - b_0] \cdot x_2 \end{cases}$$

Power function

Let f be $P(X,b) = b_0 \cdot x_1^{b_1 + b_2 x_2}$:

$$\begin{cases} \frac{\partial P}{\partial b_0} = x_1^{b_1 + b_2 x_2} & = P(X,b)/b_0 \\ \frac{\partial P}{\partial b_1} = x_1^{b_1 + b_2 x_2} \cdot b_0 \cdot \ln(x_1) & = P(X,b) \cdot \ln(x_1) \\ \frac{\partial P}{\partial b_2} = x_1^{b_1 + b_2 x_2} \cdot b_0 \cdot \ln(x_1) \cdot x_2 & = P(X,b) \cdot \ln(x_1) \cdot x_2 \end{cases}$$

So, we have the condition $x_1 > 0$, $\forall i$.