7. $$g_m = \frac{\partial}{\partial f_{m-1}(x_i)} \ell(y_i, f_{m-1}(x_i))$$

$$= \frac{\partial}{\partial f_{m-1}(x_i)} \ln\left(1+e^{-y_i f_{m-1}(x_i)}\right)$$

$$= \frac{-y_i \cdot e^{-y_i f_{m-1}(x_i)}}{1+e^{-y_i f_{m-1}(x_i)}}$$

$$= \frac{-y_i}{e^{y_i f_{m-1}(x_i)} + 1}$$

$$\Rightarrow \quad -g_m = \frac{y_i}{e^{y_i f_{m-1}(x_i)} + 1}$$

$$\boxed{\therefore \text{ Dimension of } g_m : n, \quad -g_m \in \mathbb{R}^n}$$

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8. $$h_m = \underset{h \in F}{\operatorname{argmin}} \sum_{i=1}^{n} \left((-g_m)_i - h(x_i)\right)^2$$

$$\left(\text{as } (-g_m)_i = \frac{y_i}{e^{y_i f_{m-1}(x_i)} + 1} \right),$$

$$= \boxed{\underset{h \in F}{\operatorname{argmin}} \sum_{i=1}^{n} \left(\frac{y_i}{e^{y_i f_{m-1}(x_i)} + 1} - h(x_i) \right)^2}$$