$$
\begin{aligned}
S(\mathbf{W},\mathbf{c}) &= \lambda\sum_{j=1}^{n}(p-\frac{1}{m}\sum_{l=1}^{m}\mathbb{E}[h_j^{(l)}|v^{(l)}])^2 \\
&= \lambda\sum_{j=1}^{n}(p-\frac{1}{m}\sum_{l=1}^{m}h_j^{(l)}sigm(c_l+\sum_i W_{li}x_j^{(i)}))^2 \\
\frac{\delta S(\mathbf{W},\mathbf{c})}{\delta c_k} &= \lambda\sum_{j=1}^{n}2(p-\frac{1}{m}\sum_{l=1}^{m}h_j^{(l)}sigm(c_l+\sum_i W_{li}x_j^{(i)})) \\
&\quad (-\frac{1}{m}h_j^{(k)}(1-sigm(c_k+\sum_i W_{ki}x_j^{(i)}))sigm(c_k+\sum_i W_{ki}x_j^{(i)})) \\
&= 2\lambda\sum_{j=1}^{n}(-\frac{1}{m}h_j^{(k)}(1-sigm(c_k+\sum_i W_{ki}x_j^{(i)}))sigm(c_k+\sum_i W_{ki}x_j^{(i)})) \\
&\quad (p-\frac{1}{m}\sum_{l=1}^{m}h_j^{(l)}sigm(c_l+\sum_i W_{li}x_j^{(i)}))
\end{aligned}
$$