Consider the function $\ell(\mathbf{w}) = y \log\big(\sigma(\mathbf{w}^T\mathbf{x})\big) + (1-y)\log\big(1-\sigma(\mathbf{w}^T\mathbf{x})\big)$

Where $\mathbf{w}$ and $\mathbf{x}$ are k^{th} dimensional vectors. Assume 1 training example.

Find $\nabla_{w_j}\ell(\mathbf{w})$, that is, the partial derivative of $\ell(\mathbf{w})$ with respect to the j^{th} element of vector $\mathbf{w}$.

- Recall if $\sigma(x) = \frac{1}{1+e^{-x}}$ then $\sigma'(x) = \sigma(x)\big(1-\sigma(x)\big)$
- Show your work!