

Mathematical Toolkit Assignment 1

Yota Toyama

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1.

$$\begin{aligned}\frac{\partial}{\partial \mathbf{w}} R(\mathbf{w}) &= 0 \\ \frac{\partial}{\partial \mathbf{w}} E_{p(\mathbf{x}, y)} [(y - \mathbf{w}^T \mathbf{x})^2] &= 0 \\ E_{p(\mathbf{x}, y)} [2(y - \mathbf{w}^T \mathbf{x})(-\mathbf{x})] &= 0 \\ E_{p(\mathbf{x}, y)} [(y - \mathbf{w}^T \mathbf{x})\mathbf{x}] &= 0 \\ \mathbf{a}^T E_{p(\mathbf{x}, y)} [(y - \mathbf{w}^T \mathbf{x})\mathbf{x}] &= 0 \\ E_{p(\mathbf{x}, y)} [(y - \mathbf{w}^T \mathbf{x})\mathbf{a}^T \mathbf{x}] &= 0\end{aligned}$$

2.