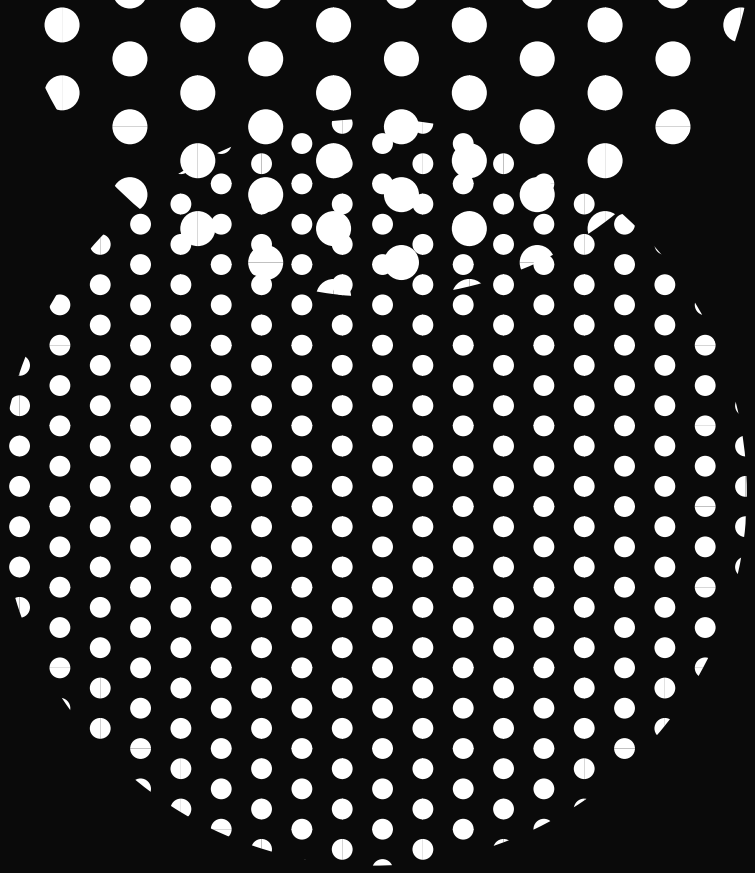

1. $\vec{\nabla} J = \begin{pmatrix} 2\theta_1 \\ 2\theta_2 \end{pmatrix}$

$-\theta_2 \, 2\theta_1 \, e^{-\theta_1^2}$

2) $\vec{\nabla} J = \begin{pmatrix} -2\theta_1\theta_2 \, e^{-\theta_1^2} \\ e^{-\theta_1^2} \\ 1 \end{pmatrix}$

$\frac{1}{x}$ x^{-1}

$-\frac{1}{x^2}$

3) $\vec{\nabla} J = \begin{pmatrix} \frac{2\theta_1}{\theta_2^2} \\ -\frac{2\theta_1^2\theta_2}{\theta_2^4} \end{pmatrix}$

4) $\vec{\nabla} J = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ \vdots \\ x_D \end{pmatrix}$

5.

1.2

1. $\vec{\theta}$

2. $\frac{1}{4} \begin{pmatrix} 4\theta_1^3 \\ \vdots \\ 4\theta_D^3 \end{pmatrix} = \begin{pmatrix} \theta_1^3 \\ \vdots \\ \theta_D^3 \end{pmatrix}$

3. $\frac{1}{2} \frac{1}{N} \sum_n^N 2\vec{x_n} \left(\theta x_n - y_n\right) = \frac{1}{N} \sum_n^N \vec{x_n} \left(\vec{\theta} x_n - y_n\right)$

4. $\frac{1}{N} \sum_n^N \vec{x_n} \left(\vec{\theta} \cdot \vec{x_n} - y_n\right)^3$