Derivatives

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1 Useful Derivatives

From "Another Walkthrough of Variational Bayes".

$$\frac{d}{dx}x = 1$$
$$\frac{d}{dx}\log(x) = \frac{1}{x}$$
$$\frac{\partial}{\partial q}\int q(x)dx = 1$$
$$\frac{\partial}{\partial q}\int \log q(x)dx = \frac{1}{q(x)}$$

2 Differentiation of Vector/Matrix

2.1 PRML Math Book p.77

$$\frac{\partial}{\partial \mu}\left(-\frac{1}{2}(x-\mu)^T\Sigma^{-1}(x-\mu)\right) = \Sigma^{-1}(x-\mu)$$

3 Differentiation of natural log

$$(e^{kx})' = (kx)'e^{kx}$$

Use the chain rule of differentiation (合成関数の微分)