

$$\log g(\eta) = A \log B - \log \Gamma(A) + (A - 1) \log \eta - B\eta$$

$$\frac{\partial}{\partial \eta} \log g(\eta) = \frac{A - 1}{\eta} - B$$

$$\frac{\partial^2}{\partial \eta^2} \log g(\eta) = -\frac{A - 1}{\eta^2}$$