$$\frac{\partial}{\partial\theta}\left\{\frac{\left(\frac{1}{\theta}\right)^{\frac{1}{\theta}} x^{\frac{1}{\theta}-1}\exp\left(\frac{-x}{\theta}\right)}{\Gamma\left(\frac{1}{\theta}\right)}\right\}=\frac{\left(\frac{x}{\theta}\right)^{\frac{1}{\theta}-1}\exp\left(\frac{-x}{\theta}\right)\left\{\ln\left(\frac{\theta}{x}\right)+\psi^{(0)}\left(\frac{1}{\theta}\right)+x-1\right\}}{\theta^{3}\Gamma\left(\frac{1}{\theta}\right)}$$