SMD

a) $L = \prod \frac{\lambda^{k_i}}{k_i!} \exp(-\lambda)$

$F = -\ln(L) = \cancel{\quad} -\prod \ln\left(\frac{\lambda^{k_i}}{k_i!}\exp(-\lambda)\right)$

$= -\sum_i \left(k_i \ln(\lambda) - \ln(k_i!) - \lambda\right)$

$\frac{dF}{d\lambda} = -\sum_i^n \frac{k_i}{\lambda} - 1 = n - \sum_i \frac{k_i}{\lambda} \stackrel{!}{=} 0$

$\Leftrightarrow \hat{\lambda} = \frac{1}{n} \sum_i^n k_i$

b) analog: $F = -\sum_i \left(k_i \ln(a x_i + b) - \ln(k_i!) - (x_i a + b)\right)$

c) $H_0: \quad \hat{\lambda}_0 = a x_i + b$

$H_1: \quad \hat{\lambda}_1 = \frac{1}{n} \sum_i^n k_i$

$\Gamma = \frac{L_0}{L_1}$ Wilks-Theorem: $D = -2\ln(\Gamma) = 2 \frac{F_0}{F_1}$

$\Rightarrow D = 2 \sum_i^n k_i \ln(a x_i + b) - (x_i a + b) - k_i \ln(\hat{\lambda}_1) + \hat{\lambda}_1$

Gültigkeit kann angenommen werden, da H_0 aus linearer Transformation von H_1 hervorgeht