12. $\rho \neq 1$
$p_n, N_Q = ?$

$p_n = \rho^n p_0$

$p_0 = \dfrac{1-\rho}{1-\rho^{K+1}}$

$n = 1 \ldots K$

$\mu p_n = \lambda p_{n-1} \Rightarrow p_n = \dfrac{\lambda}{\mu} p_{n-1} = \rho p_{n-1} = \rho(\rho p_{n-2}) = \ldots = \rho^n p_0$

$\sum_{n=0}^{K} p_n = 1 \Rightarrow p_0 \sum_{n=1}^{K} \rho^n = 1 \Rightarrow p_0 \dfrac{1-\rho^{K+1}}{1-\rho} = 1 \Rightarrow p_0 = \dfrac{1-\rho}{1-\rho^{K+1}}$

$N = \sum_{n=0}^{K} n p_n = (1-\rho) \sum_{n=1}^{K} n\rho^n = (1-\rho)\rho \sum_{n=1}^{K} n\rho^{n-1} = (1-\rho)\rho \dfrac{\partial}{\partial \rho} \left(\sum_{n=1}^{K} \rho^n \right) =$
$(1-\rho)\rho \dfrac{\partial}{\partial \rho} \left(\dfrac{1-\rho^{K+1}}{1-\rho} \right) = (1-\rho)\rho \dfrac{-(K+1)\rho^K (1-\rho) + (1-\rho^{K+1})}{(1-\rho)^2} = \dfrac{\rho}{1-\rho} [1-\rho^{K+1} -$
$(K+1)(1-\rho^{K+1})] = \dfrac{\rho}{1-\rho} [\rho^K(K\rho-K+1)+1] = \dfrac{\lambda}{\mu-\lambda} [\rho^K(K\rho-K+1)+1]$

$T = \dfrac{N}{\lambda} = \dfrac{1}{\mu-\lambda} [\rho^K(K\rho-K+1)+1]$

$W = T - \dfrac{1}{\mu} = \dfrac{\mu}{\mu(\mu-\lambda)} [\rho^K(K\rho-K+1)+1] - \dfrac{\mu-\lambda}{\mu(\mu-\lambda)} = \dfrac{\mu\rho^K (K\rho - K + 1) + \lambda}{\mu(\mu-\lambda)}$

$N_Q = \lambda W = \dfrac{\mu\lambda\rho^K (K\rho - K + 1) + \lambda^2}{\mu(\mu-\lambda)}$