CW.

$$= \sum_{k=0}^{\infty} \Big[(k+1) P_k \left(k_1 (N-k)\right) + \frac{k_2}{v} k (N-k) + \frac{k_3}{v^2} k (k-1)(N-k)\Big)$$

$$+ \sum_{k=0}^{\infty} \Big((k-1) P_k \Big(k_1 k + \frac{k_2}{v} k (N-k) + \frac{k_3}{v^2} \left(k (N-k)(N-k-1)\right)\Big)$$

$$- \sum_{k=0}^{\infty} \Big[k P_k \Big(k_1 N + \frac{2k_2}{v} k (N-k) + \frac{k_3}{v^2} k (N-k)(N-2)\Big)$$

$$= \underbrace{\sum_{k=0}^{\infty} P_k\, k_1 \left((k+1)(N-k) + (k-1)k - kN\right)}_{\text{part 1}} + \underbrace{\sum_{k=0}^{\infty} P_k \frac{k_2}{v} k (N-k) \underbrace{(k+1+k-1-2k)}_{0}}_{0}$$

$$+ \underbrace{\sum_{k=0}^{\infty} P_k \frac{k_3}{v^2} \Big((k+1) k (k-1)(N-k) - k^2 (N-k)(N-2) + k (N-k)(N-k-1)(k-1)\Big)}_{\text{part 2.}}$$

part 1: $= \sum_{k=0}^{\infty} P_k\, k_1 \left(kN - k^2 + N - k + k^2 - k - kN\right) =$

$$\sum_{k=0}^{\infty} P_k\, k_1 (N-2k) = k_1 (N - 2\langle n\rangle)$$

part 2:

$$= \sum_{k=0}^{\infty} P_k \frac{k_3}{v^2} \left(k(k-1)(k+1)(N-k) + (k-1)k (N-k)(N-k-1) - k^2 (N-k)(N-2)\right) =$$

$$\sum_{k=0}^{\infty} P_k \frac{k_3}{v^2} \left(k(k^2-1)(N-k) + k (N-k)(k-1)(N-k-1) - k^2 (N-k)(N-2)\right) =$$

$$\sum_{k=0}^{\infty} P_k \frac{k_3}{v^2} \left(k^2 - 1 + Nk - k^2 - k - N + k + 1 - Nk + 2k\right) =$$

$$\sum_{k=0}^{\infty} P_k \frac{k_3}{v^2} \left(k (N-k)(2k-N)\right) = \sum_{k=0}^{\infty} P_k \frac{k_3}{v^2} (Nk - k^2)(2k - N) =$$

$$\sum_{k=0}^{\infty} P_k \frac{k_3}{v^2} \left(2Nk^2 - N^2 k - 2k^3 + k^2 N\right) = \sum_{k=0}^{\infty} P_k \frac{k_3}{v^2} \left(3Nk^2 - 2k^3 - N^2 k\right)$$

$$= 3N \langle n^2\rangle - N^2 \langle n\rangle - 2\langle n^3\rangle \quad \Rightarrow \quad \frac{\partial \langle n\rangle}{\partial t} = k_1 (N - 2\langle n\rangle) + \frac{k_3}{v^2} \left(3N\langle n^2\rangle - N^2\langle n\rangle - 2\langle n^3\rangle\right)$$