STEP III, 1998, Q3

3 The value V_N of a bond after N days is determined by the equation

$$V_{N+1} = (1+c)V_N - d \qquad (c > 0,\ d > 0),$$

where c and d are given constants. By looking for solutions of the form $V_T = Ak^T + B$ for some constants A, B and k, or otherwise, find V_N in terms of V_0.

What is the solution for $c = 0$? Show that this is the limit (for fixed N) as $c \to 0$ of your solution for $c > 0$.