

Derive the following relationships regarding policy values. Presentation matters (you may likely have to do this kind of work on written exam questions, so present for me like passing an actuarial exam is on the line).

1. Given that the net premiums for a fully discrete, whole life policy are computed using the equivalence principle, derive the formula for ${}_kV$ in terms of \ddot{a}_x and \ddot{a}_{x+k} (only).
2. Consider a policy where the death benefit is equal to a fixed value, say c , plus the net premium reserve.
 - (a) Using the recursive formula (working from the future backward) to derive

$${}_kV = c \sum_{j=1}^{n-k} v^j q_{x+n-1} + {}_nV v^{n-k} - P \ddot{a}_{\overline{n-k}|}.$$

- (b) Using the recursive formula (working from the past forward) to derive

$${}_kV = P \ddot{s}_{\overline{k}|} - c \sum_{j=1}^k q_{x+j-1} (1+i)^{k-j}.$$

This is probably the more useful version of the two.