Health Insurance Mathematics –Assignments (4)

Programming environment: *Excell, OpenOffice, R.*

Consider a 3-state discrete-time widow insurance model (see picture below). Suppose that at the policy issue time both wife and husband are x-years old. State 1 means that both insured are alive, 2- one insured is dead, 3-both are dead. Suppose that the future life-times of the insured are i.i.d. and satisfy attached life tables. Suppose that the policy term $n=30$ and $b_2(t)=b$, $c_{23}=c_{13}=c$ (given parameters of the model).

a) (10p) Derive transition probabilities $P_{ij}(y,y+1)$.

b) (10p) For given x (age at entry) and interest i, find the nett single premium $\pi_1(0)$.

c) (10p) For given x (age at entry) and interest i, find the nett constant annual premium $p_1(0)=p$.

d) (10p) Find prospective reseves for states 1 and 2. Make drawing.

e) (10p) Prepare report describing how you obtained the formulas and providing derivations for $n=30$, $i=10\%$, $b=1000$, $c=10000$, $x=25$.