

Health Insurance Mathematics –Assignments (3)

1. (10p) Check the formula for Thiele differential equations (see lectures).
2. (10p) For the model of Example 9, with $b_2(u)=b$, $p_1(u)=p$ and constant transition intensities, find explicit formulas for prospective reserves for states 1 and 2.
3. (10p) Consider classical n -year pure life insurance with single lump premium paid at time 0. Find the distribution of the loss function.
4. (10p) Consider classical n -year pure endowment insurance with single lump premium paid at time 0. Find the distribution of the loss function.
5. (15p) Consider 3-state model with $\mu_{12}=0.02$, $\mu_{23}=0.01$, $\mu_{13}=0.01$ (other transition intensities are equal to 0) and $n=10$, $v=1$. Suppose that $b_2(u)=1$ and $c_{23}=10$ and $p_1(u)=p$ is the net premium rate. Find p and prospective reserves $V_1(t)$, $V_2(t)$.
6. (15p) Consider model described in Example 6. Let $\mu_{12}=0.02$, $\mu_{13}=0.2$, $\mu_{14}=0.01$. Suppose that $b_2(u)=10$, $c_{13}(u)=100$ and $c_{14}=200$ and $n=10$, $v=1$. Find net premium $p_1(u)=p$ and prospective reserves $V_1(t)$, $V_2(t)$, $V_3(t)$.
7. (15p) Consider model described in Example 7. Let $\mu_{12}=0.02$, $\mu_{23}=0.25$. Suppose that $b_2(u)=10$, $c_{23}(u)=100$ and $n=10$, $v=1$. Find net premium $p_1(u)=p$ and prospective reserves $V_1(t)$, $V_2(t)$.
8. (15p) Consider model described in Example 8. Let $\mu_{12}=0.02$, $\mu_{23}=0.25$, $\mu_{13}=0.25$. Suppose that $b_2(u)=10$, $c_{13}(u)=100$ and $n=10$, $v=1$. Find net premium $p_1(u)=p$ and prospective reserves $V_1(t)$, $V_2(t)$.
9. (15p) Consider model described in Example 11. Let $\mu_{12}=0.02$, $\mu_{24}=0.04$, $\mu_{13}=0.04$, $\mu_{34}=0.02$. Suppose that $b_2(u)=b_3(u)=10$, $c_{24}(u)=c_{34}(u)=100$ and $n=10$, $v=1$. Find net premium $p_1(u)=p$ and prospective reserves $V_1(t)$, $V_2(t)$, $V_3(t)$.