Exercise 8.1

The Actuarial Present Value of the death benefit can be expressed as

$$100000 \times \int_0^{10} v^t \left({}_t p_{50}^{00} \mu_{50+t}^{02} + {}_t p_{50}^{01} \mu_{50+t}^{12} \right) dt.$$

The Actuarial Present Value of the bonus benefit, which is received if the insured stays healthy continuously for 10 years, can be expressed as

$$10000 \times v^{10} \, {}_{10}p_{50}^{\overline{00}} = 10000 \times v^{10} \times \exp \left[-\int_0^{10} \left(\mu_{50+t}^{01} + \mu_{50+t}^{02} \right) dt \right].$$

Here we write $v = e^{-\delta}$.