**Exercise 8.3**

Let \( P \) be the annual premium rate so that

\[
\text{APV(premiums)} = P \times \int_0^2 e^{-0.05t} p_{50}^{00} dt
\]

\[
= P \times \int_0^2 e^{-0.05t} \left( \frac{2}{3} e^{-0.015t} + \frac{1}{3} e^{-0.01t} \right) dt
\]

\[
= P \times \frac{1}{3} \left[ \frac{2}{.065} (1 - e^{-0.065(2)}) + \frac{1}{.06} (1 - e^{-0.06(2)}) \right]
\]

\[
= P \times 1.878523
\]

and

\[
\text{APV(benefits)} = 60000 \times \int_0^2 e^{-0.05t} p_{50}^{00} dt
\]

\[
= 60000 \times \frac{2}{3} \int_0^2 e^{-0.05t} (e^{-0.01t} - e^{-0.015t}) dt
\]

\[
= 60000 \times \frac{2}{3} \left[ \frac{1}{.06} (1 - e^{-0.06(2)}) - \frac{1}{.065} (1 - e^{-0.065(2)}) \right]
\]

\[
= 368.1792
\]

Solving for the premium, we get

\[
P = \frac{368.1792}{1.878523} = 195.994.
\]