Show all work for full credit, and use correct notation. Simplify answers completely.

For a multi-state model with states 0, 1, and 2, you are given:

\[ \mu_x^{01} = 0.01 \quad \mu_x^{02} = 0.02 \quad \mu_x^{12} = 0.03 \]

All other transition intensities are equal to 0. Determine

1. \[ 10P_x^{00} \]

\[ 10P_x^{\infty} = 10P_x^\infty = e^{-\int_0^{10} (\mu_x^{01} + \mu_x^{02}) \, dt} = e^{-\int_0^{10} 0.03 \, dt} \]

\[ \Rightarrow 10P_x^{\infty} = e^{-0.3(10)} = e^{-3} = 0.740... \]

2. \[ 10P_x^{11} \]

\[ 10P_x^{\infty} = 10P_x^\infty = e^{-\int_0^{10} \mu_x^{12} \, dt} = e^{-\int_0^{10} 0.03 \, dt} \]

\[ \Rightarrow 10P_x^{11} = e^{-0.3(10)} = e^{-3} = 0.740... \]

3. \[ 10P_x^{22} = 1 \]

4. \[ 10P_x^{10} = 0 \]

5. If \[ 10P_x^{01} = 0.082 \], then determine \[ 10P_x^{02} \].

\[ 10P_x^{02} = 1 - 10P_x^{\infty} - 10P_x^{01} \]

\[ = 1 - (0.740...) - 0.082 = 0.177... \]