MATH 3631 - Actuarial Mathematics II
Spring 2020 - Valdez
Quiz No. 4
Wednesday, 11 March 2020

Name: Emil **Student ID:** Suggested Solution

Consider a group of 500 healthy policyholders. A policyholder may be in one of three states: healthy (h), sick (s), or dead (d). The annual transition probabilities are as follows:

$$\begin{array}{c} \\ \text{h} \\ \text{s} \\ \text{d} \end{array} \begin{array}{c} \begin{array}{ccc} \text{h} & \text{s} & \text{d} \end{array} \\ \begin{pmatrix} 0.85 & 0.10 & 0.05 \\ 0.20 & 0.60 & 0.20 \\ 0.00 & 0.00 & 1.00 \end{pmatrix} \end{array}$$

How many of the 500 healthy policyholders do you expect to be dead within two years?

$$\begin{pmatrix} 0.85 & 0.10 & 0.05 \\ 0.20 & 0.60 & 0.20 \\ 0 & 0 & 1 \end{pmatrix} \times \begin{pmatrix} 0.85 & 0.10 & 0.05 \\ 0.20 & 0.60 & 0.20 \\ 0 & 0 & 1 \end{pmatrix}$$

$$Prob = {}_2Q^{hd} = 0.85(.05) + 0.10(0.20) + 0.05(1)$$

$$= 0.1125$$

$$E(N) = 500 * 0.1125 = 56.25$$