MATH 3631 - Actuarial Mathematics II
Spring 2013 - Valdez
Homework No. 5
due Monday, 7:00 PM, April 15, 2013

Please return this page with your signature. Please write your name and student number at the spaces provided:

Name: _____ **Student ID:** _____

I certify that this is my own work, and that I have not copied the work of another student.

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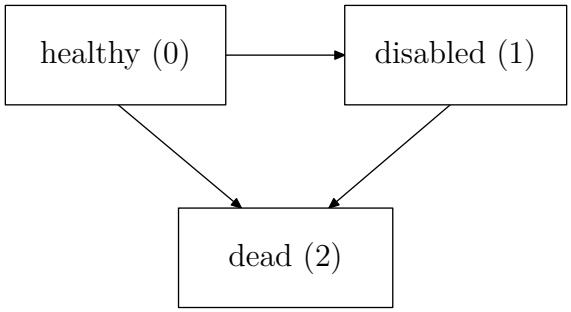
A special permanent disability policy is being priced using a multiple state model with states as expressed in the following diagram:



You are given:

- The policy is issued to a healthy person age x.
- The forces of transitions are independent of age and time:

$$\mu^{01} = 0.001 \quad \mu^{02} = 0.005 \quad \mu^{12} = 0.012$$

- For the next 10 years, the death benefit is \$ 100,000 for a healthy policyholder and \$ 50,000 for a disabled policyholder. No death benefit is payable after 10 years from issue.
- For the next 10 years, the disability benefit is payable continuously at the rate of \$ 25,000 per year. No disability benefit is payable after 10 years from issue.
- Premiums are payable continuously at the rate of P per year while policyholder is healthy, for a maximum of 10 years.
- $\delta = 5\%$

(a) (3 points) Calculate ${}_{10}p_x^{00}$, ${}_{10}p_x^{01}$, and ${}_{10}p_x^{02}$.

(b) (4 points) Calculate P based on the equivalence principle.

(c) (3 points) Calculate the reduction in P if there is no death benefit associated with a disabled policyholder.