

**MATH 3631 - Actuarial Mathematics II**  
**Spring 2012 - Valdez**  
**Homework No. 2**  
**due Monday, 7:00 PM, February 27, 2012**

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.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

DEF Life Insurance Company issued 10,000 fully discrete whole life insurance policies to lives all exactly age 50 on January 1, 2008. Each policy issued has a death benefit of \$100,000 with an annual gross premium of \$5,297.

Premiums and reserves are both calculated on the following basis:

- Interest: 6% per year
- Expenses: 50% of the first year premium  
5% of each subsequent premium

You are given the following gross premium reserves per policy together with relevant mortality rates for the first 5 years:

$k$	$1000 q_{50+k}$	${}_kV$
0	26.7502	0.00
1	28.8357	136.30
2	31.0831	2672.55
3	33.5044	5221.47
4	36.1126	7779.54
5	38.9216	10343.15

You are provided the following additional information:

- 9,000 policies remain in force as of January 1, 2011.
  - The company incurred expenses on January 1, 2011, related to these policies, for a total of \$2,200,000.
  - The company earned an interest of 5.5% on its assets backing these policies during 2011.
  - During 2011, the total number of deaths is 380.
- (a) Calculate the total gain or loss of DEF Life Insurance Company during year 2011 out of this block of policies.
- (b) Allocate this total gain or loss according to the following sources (in the given order): expenses, interest and mortality.