

1. A whole life insurance policy on (75) has a death benefit of 100,000 paid at the end of the year of death. The annual gross premium is 9700.

Chenxi performs a profit test on this policy. The interest rate used in the profit test is 8%. Mortality follows the Standard Ultimate Life Table.

The other profit test information is listed below for the first four years:

Year	Withdrawals	Reserve End of Year	Percent of Premium Expense	Per Policy Expense
1	20%	3,710	60%	125
2	10%	7,390	10%	25
3	8%	11,033	5%	25
4	4%	14,625	2%	25

Withdrawals occur at the end of the year. Cash values are equal to 80% of the reserves.

Calculate π_2 which is the profit signature for the second year.

2. You are given the following profit vector for a whole life issued to (94):

t	P_t
0	-900
1	700
2	500
3	300
4	100

Mortality is the only decrement and follows the table below:

x	l_x
92	2500
93	2250
94	2000
95	1600
96	960
97	384
98	0

The gross premium used in the profit test is 1000.

Calculate the Profit Margin for this profit test using an interest rate of 8%.

3. You are given $c = 1.04$, $j = 5\%$, $i = 7\%$.

Calculate i^* .