

Solution # 289

Given: For a 3-year term

Death benefit = 1,000,000 (EOY)

$$q_{60+t} = .014 + .001t$$

Premium = 14,500 (annually)

Expense at $t=0 = 1000$

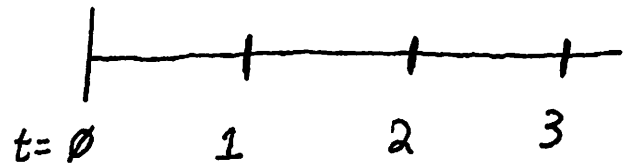
Expense = 100 (annually)

$$i_{\text{cash flow}} = .06$$

$$i_{\text{profits}} = .10$$

Reserve end of 1st & 2nd year = 700

Premium: 14,500 14,500 14,500



Initial Expense (1000)

Annual Expense (100) (100) (100)

Time $t=0$: $\Pi = -1000$

Time $t=1$:

$$\Pi = (0V + \text{Prem} - \text{Exp})(1 + i_{\text{cash}}) - q_{60}(\text{Death Ben}) - P_{60}(iV)$$

$$\Pi_1 = (0 + 14500 - 100)(1.06) - (.014(1,000,000)) - (.986 \cdot 700) = 573.8$$

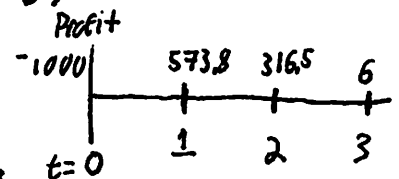
$t=2$

$$\Pi_2 = (700 + 14500 - 100)(1.06) - (.015(1,000,000)) - (.985 \cdot 700) = 316.5$$

$t=3$

$$\Pi_3 = (700 + 14500 - 100)(1.06) - (.016(1,000,000)) - (.984 \cdot 0) = 6$$

| Time (t) | Profit (P) |
|----------|------------|
| 0 | -1000 |
| 1 | 573.8 |
| 2 | 316.5 |
| 3 | 6 |



$$\begin{aligned} \text{NPV} &= -1000 + 573.8v + 316.5v^2 + P_{60} + 6 {}_2P_{60}v^3 \\ &= -1000 + 573.8 \frac{1}{1.1} + 316.5 \frac{1}{(1.1)^2} + (.986) + 6 (.986)(.985) \frac{1}{(1.1)^3} \\ &= -216.077 \end{aligned}$$

$$\approx -216$$

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