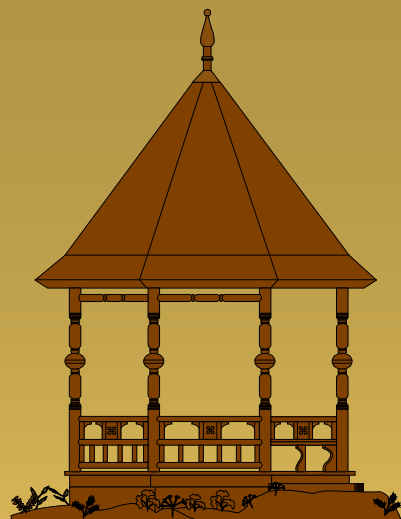


XXX Regulation

Segmented & Unitary Reserves

April 29, 1999

Chicago, IL

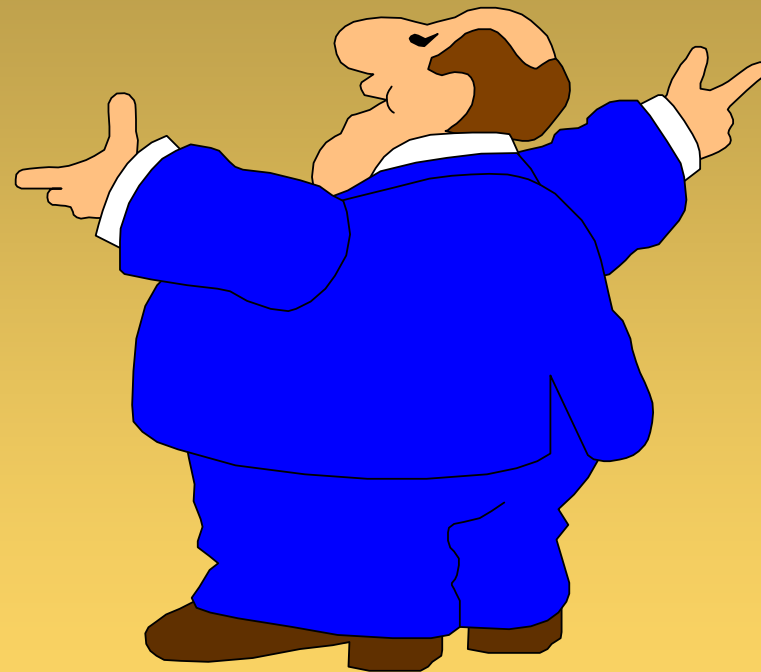


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Consulting Actuary
Van Elsen Consulting
Colfax, Iowa

Presentation Outline

- ◆ Define Segments
- ◆ Sample Segments
- ◆ Unitary Method
- ◆ Sample Unitary
- ◆ Comparison
- ◆ Questions



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Define Segments

- ◆ General Rule: New Segment When Premium Increases Faster Than Mortality
- ◆ GP is **Guaranteed** Gross Premium
- ◆ q is valuation mortality rate used for deficiencies

$$\frac{GP_{x+k+t}}{GP_{x+k+t-1}} > \frac{q_{x+k+t}}{q_{x+k+t-1}}$$

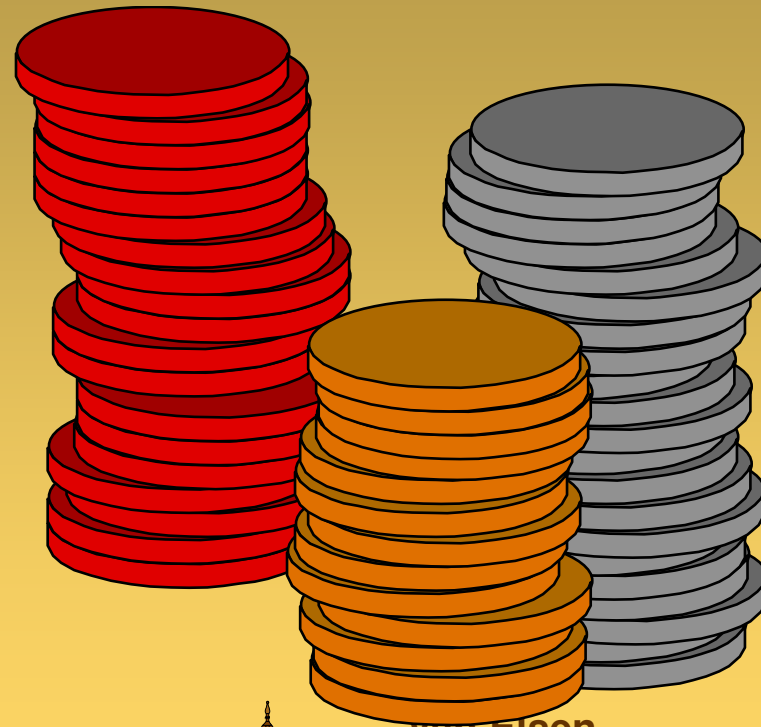


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Guaranteed Gross Premiums

- ◆ Guaranteed & Determined at Issue
- ◆ Guarantee May be Explicit or Implicit
- ◆ Premiums That Are Dependent on External Events are Not “Determined” at Issue
- ◆ Policy Fees Ignored if Level



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Special Rules



- ◆ If 0 Gross Premium Followed by Positive Premium \Rightarrow New Segment
- ◆ If Both Premiums 0 \Rightarrow Keep Current Segment



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Valuation Mortality Rate



- ◆ Rates Used for Deficiency Reserves
- ◆ No “X” Factor
- ◆ Use Selection Factors if Used for Deficiency Reserves



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Select Factors After 1st Segment?

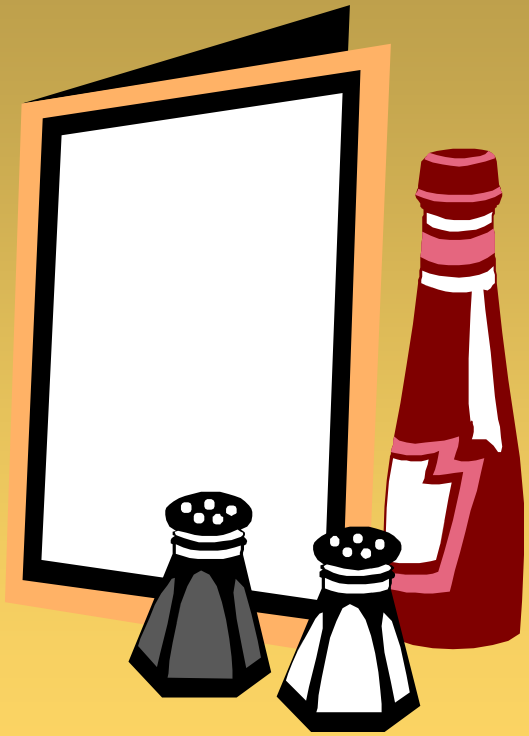
- ◆ May get Circular if Ultimate Rates Used
- ◆ Recommend Using Appropriate Select Factors (**for Segment Testing Only**)
- ◆ Consistent with Intent
- ◆ Only a Factor in a Few Situations



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Options



- ◆ Unusual Cash Values
- ◆ Grade to Unitary
- ◆ Grade to Guaranteed Cash Surrender Values



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1st Segment Net Premiums

$$P_{x+t} = k \times GP_{x+t}$$

$$k = \frac{A_{x:n} + {}_nCV_x \frac{D_{x+n}}{D_x} + EA_x^{CRVM}}{\sum_{t=1}^n GP_{x+t} \frac{D_{x+t}}{D_x}}$$



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Renewal Segment Net Premiums

$$P_{x+t} = k \times GP_{x+t}$$

$$k = \frac{A_{x:n} + {}_nCV_x \frac{D_{x+n}}{D_x} - CV_x}{\sum_{t=1}^n GP_{x+t} \frac{D_{x+t}}{D_x}}$$



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Examples

Current: 20-Year Level Term, Followed by ART

Guaranteed:

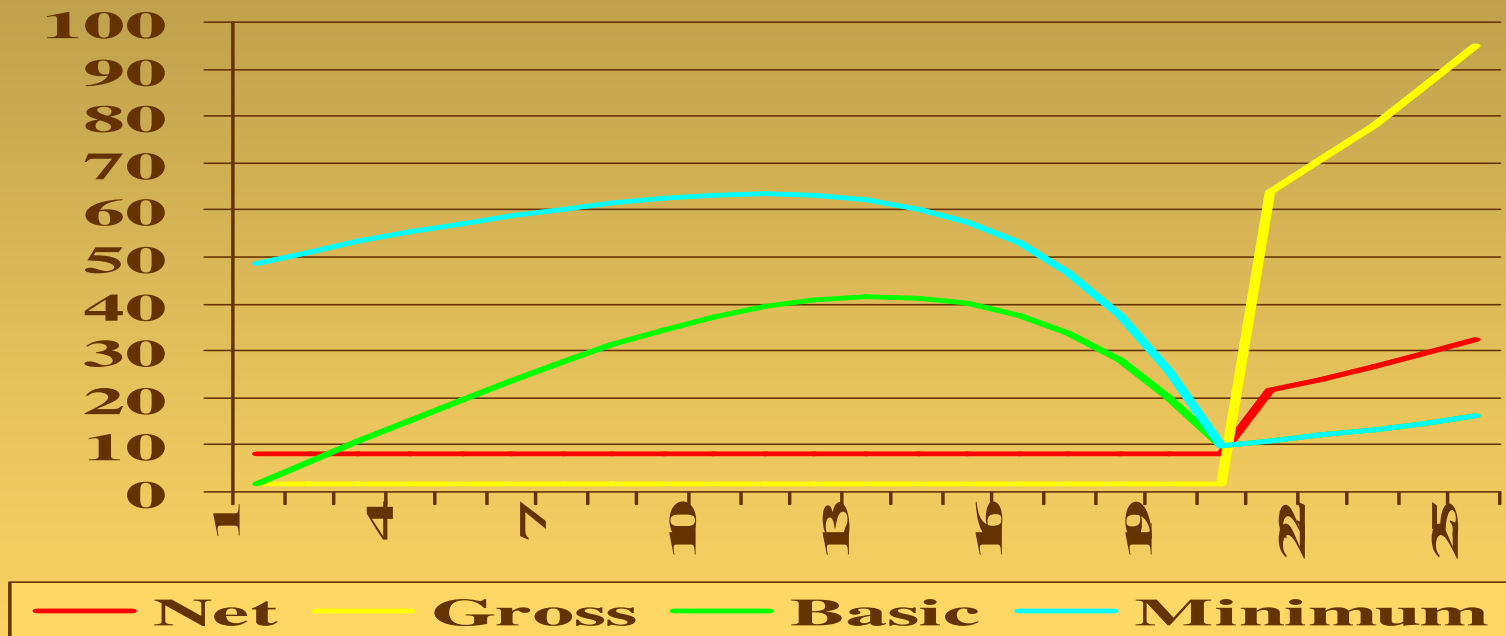
- 1 20-Year Term, Full Guarantee, Followed by ART
- 2 5-Year Guarantee
- 3 Increased Premiums with Full Guarantee
- 4 Original Premiums, Reduced Death Benefits



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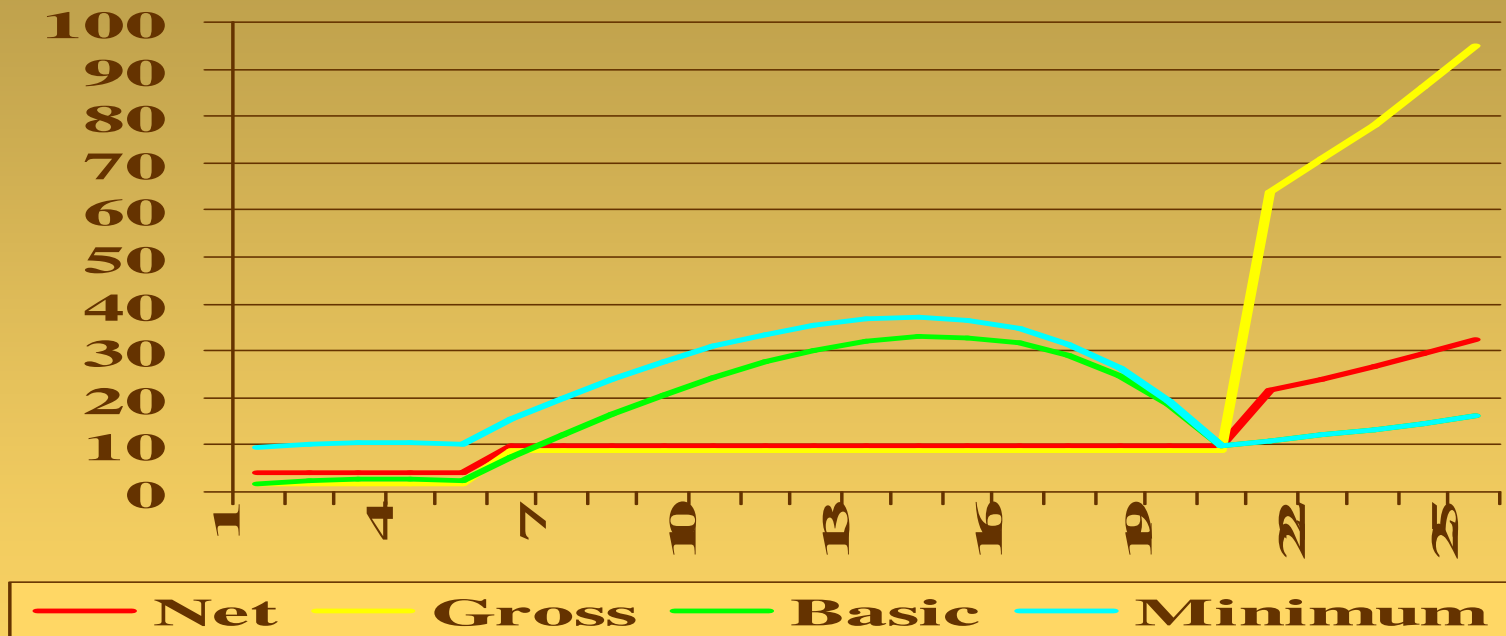
Example #1



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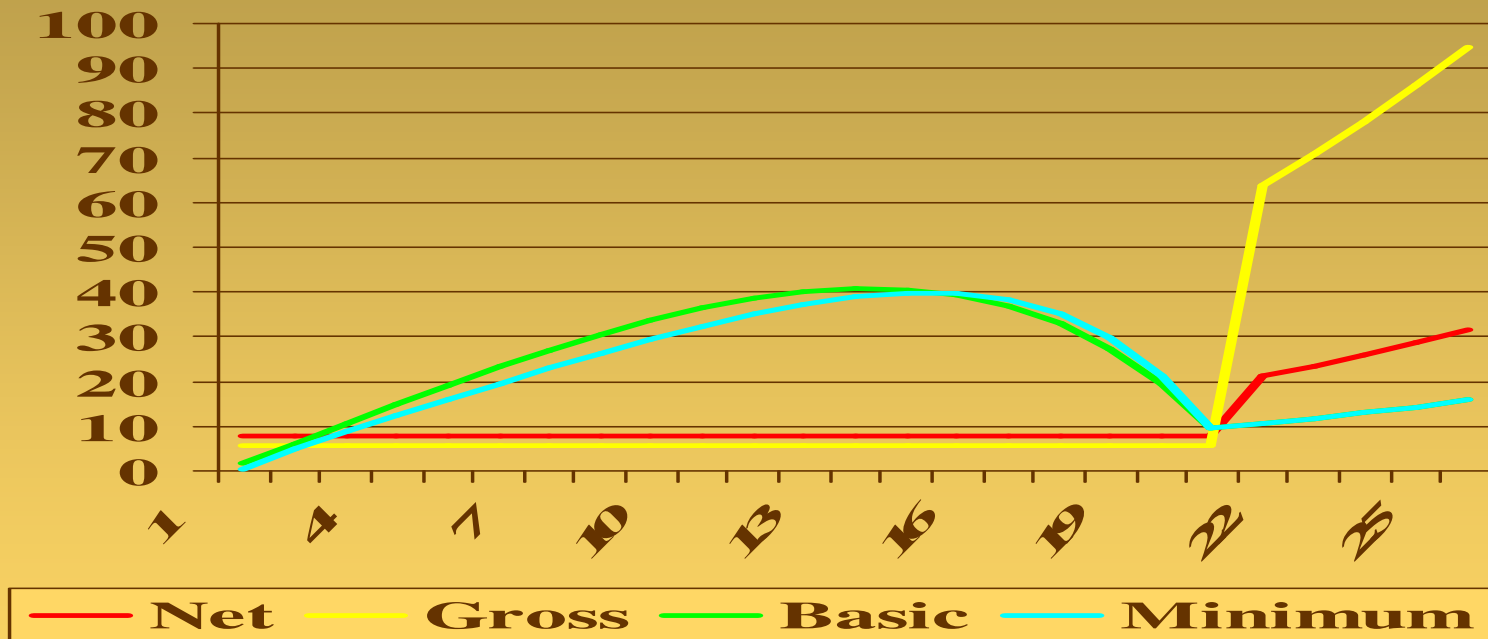
Example #2



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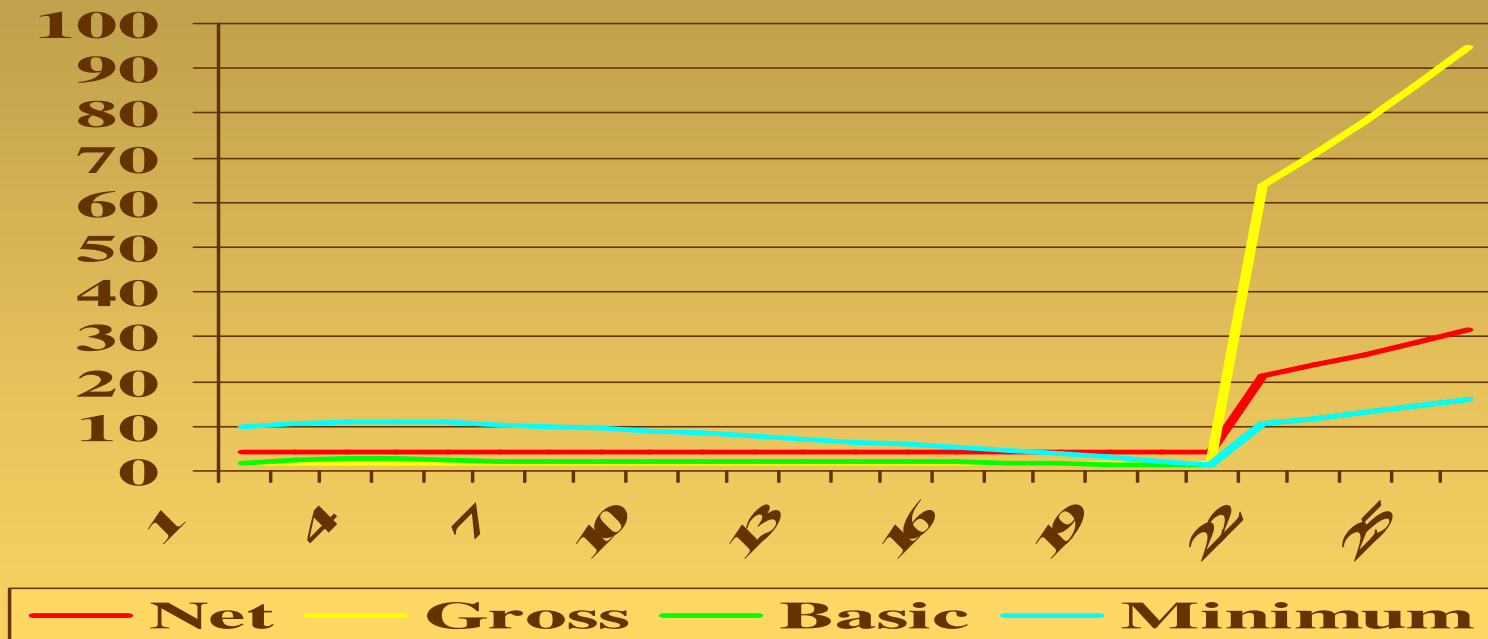
Example #3



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Example #4



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Calculate Unitary Reserves

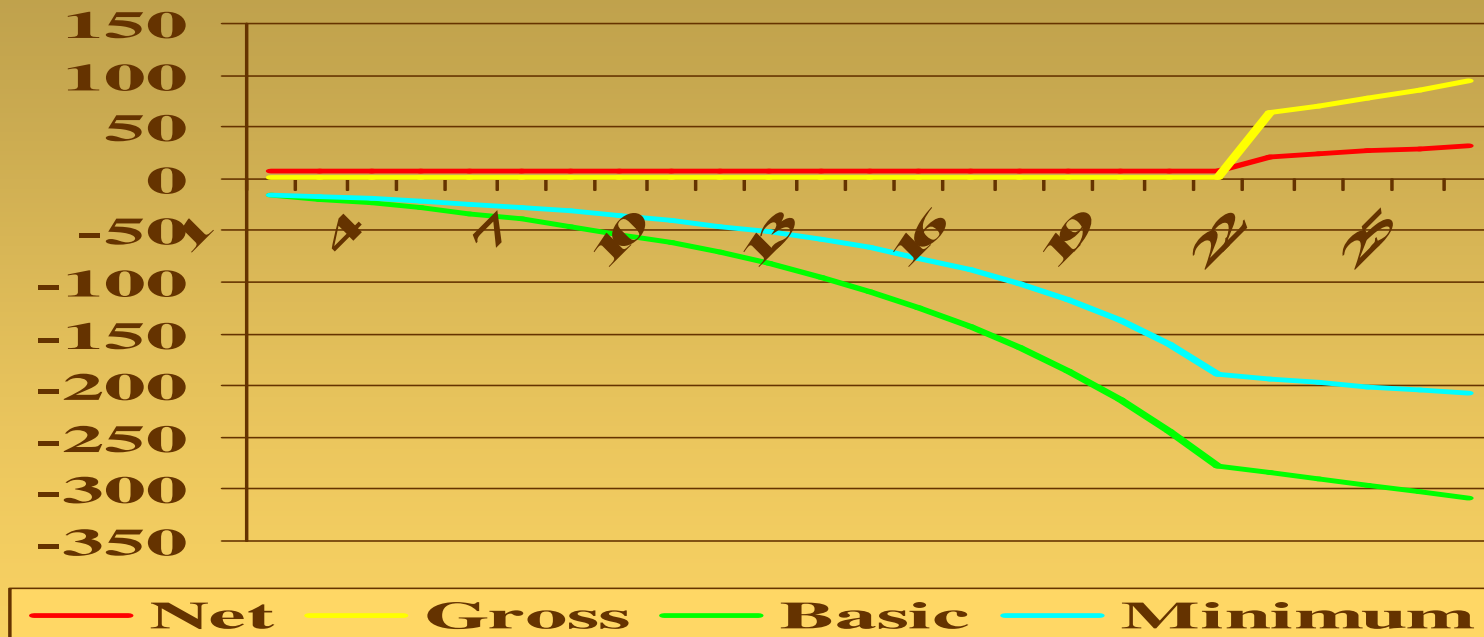
- ◆ Not Often a Factor
- ◆ May Come to Play in Later Durations
- ◆ Essentially the Same as Segmented, Only 1 Segment
- ◆ Must Hold the Greater of Unitary & Segmented



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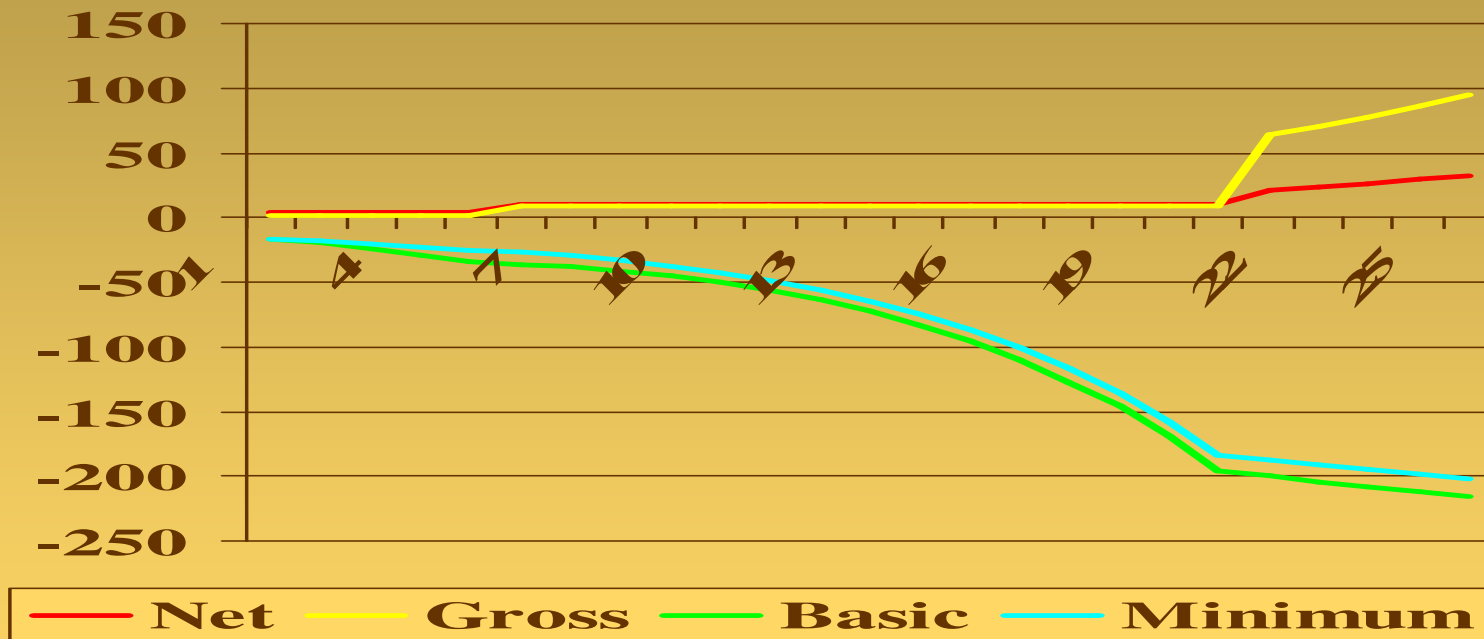
Example #1



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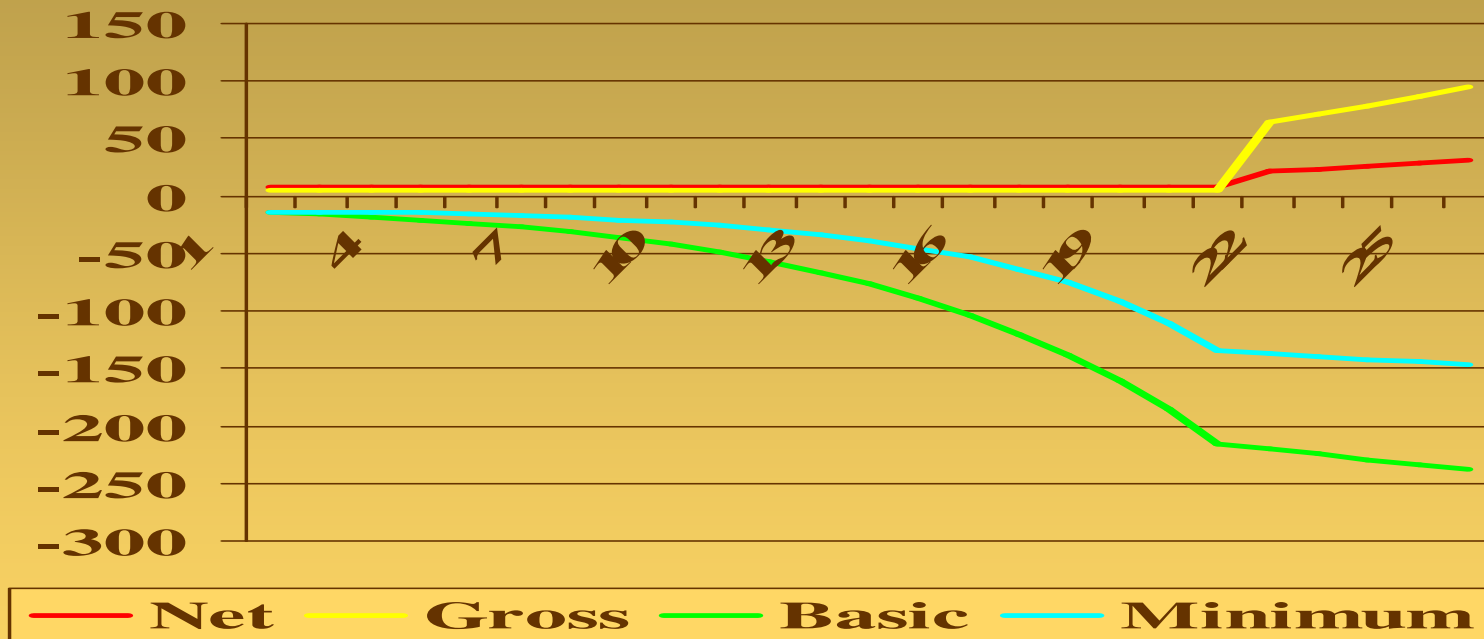
Example #2



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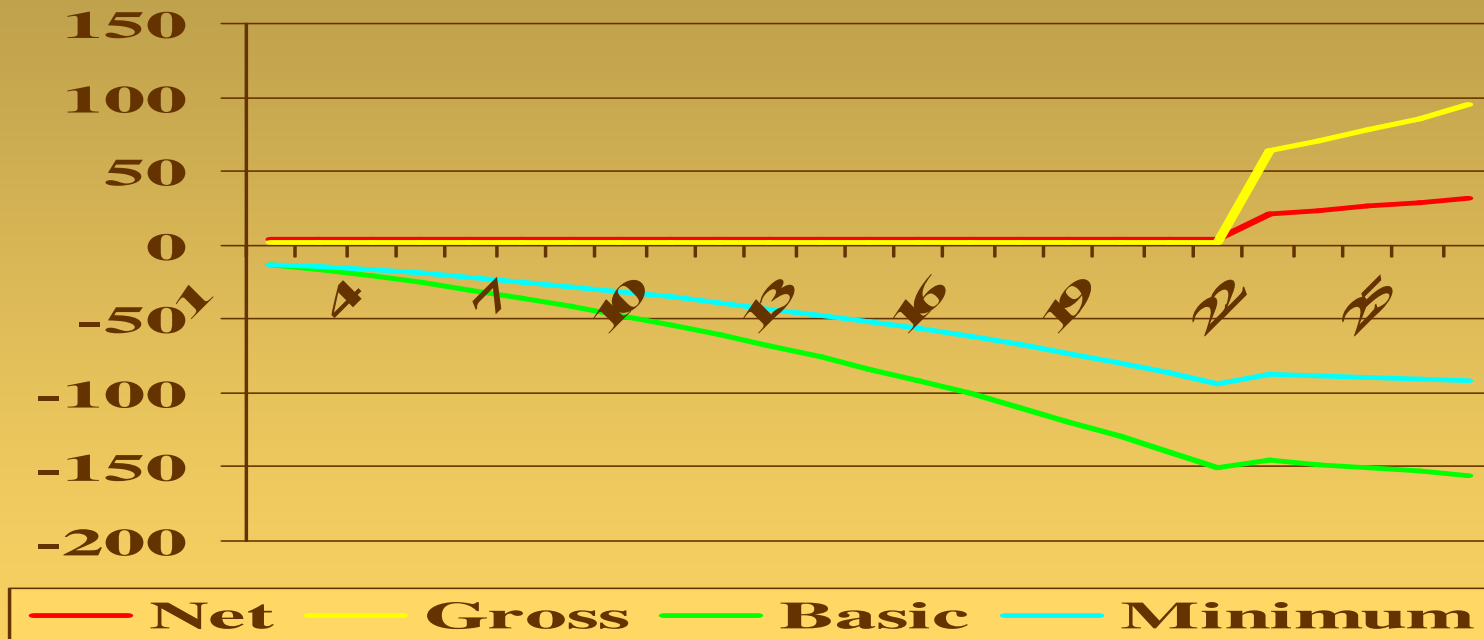
Example #3



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Example #4



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But, Not Always!!!



◆ Example #5

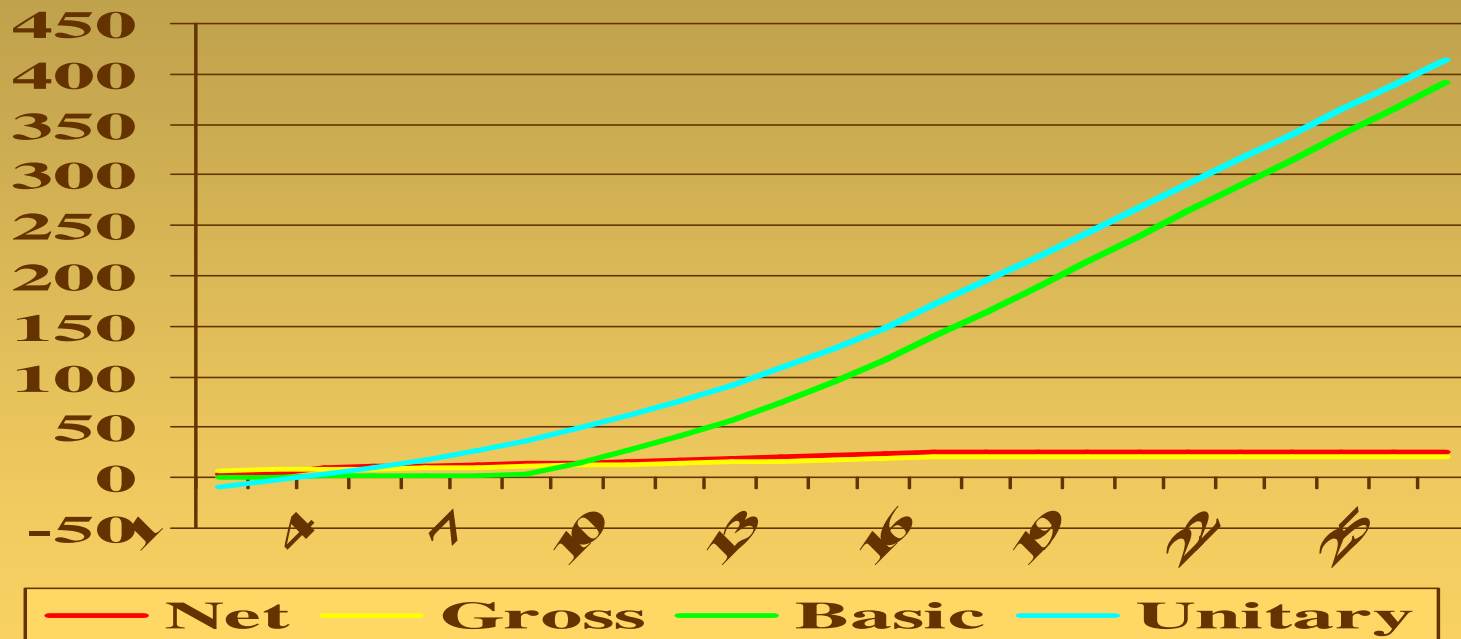
- 15-Year Graded Premium Whole Life
- Segmented Initially Higher
- Unitary Higher in Almost All Durations



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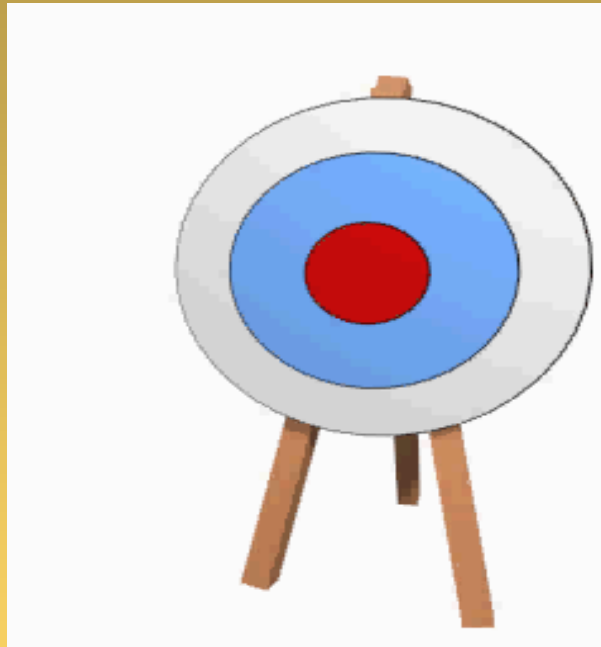
Example #5



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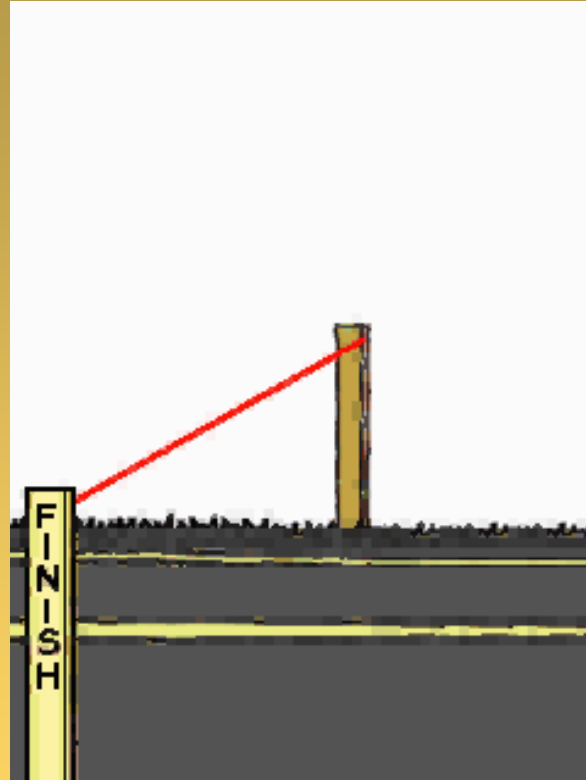
Questions & Answers



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The End



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