5. (2.25 points)

The following increased limits factors (ILFs) are used to price a general liability policy:

Aggregate Limit (000)	Occurrence Limit (000)				
	$25	$50	$100	$250	$500
$25	1.00				
$50	1.50	1.70			
$100	1.80	2.05	2.50		
$250	2.00	X	2.80	3.15	
$500	2.17	2.47	3.05	3.45	3.60

Calculate the range of possible values for the $50,000 occurrence / $250,000 aggregate ILF such that all the factors in the table pass the two-dimensional consistency test.

CONTINUED ON NEXT PAGE

Question 5:

Model Solution 1

First, hold the agg limit constant:

$$\frac{X-2}{25} \geq \frac{2.8-X}{50} \geq \frac{3.15-2.8}{150}$$

$$\frac{X-2}{25} \geq \frac{2.8-X}{50} \geq .0023$$

$$2X-4 \geq 2.8-X \qquad 2.68 \geq X$$

$$3X \geq 6.8$$

$$X \geq 2.27$$

Next hold the occ limit constant:

$$\frac{2.05-1.7}{50} \geq \frac{X-2.05}{150} \geq \frac{2.47-X}{250}$$

$$.007 \geq \frac{X-2.05}{150} \qquad 250X-512.5 \geq 370.5-150X$$

$$3.1 \geq X \qquad 400X \geq 883$$

$$X \geq 2.208$$

so $2.27 \geq X \geq 2.68$

Model Solution 2

Same occ limits, vary agg limit

\$50K/25K occ limits:	$2.05 - 1.8 < x - 2.0 < 2.47 - 2.17$
	$2.25 < x < 2.30$
\$100K/\$50K occ limits:	$2.5 - 2.05 < 2.80 - x < 2.05 - 2.47$
	$2.35 < x < 2.22$

Same agg limits, vary occ limit

\$100K/250K agg	$2.0 - 1.8 < x - 2.05 < 2.8 - 2.5$
	$2.25 < x < 2.35$
\$250K/500K agg	$2.17 - 2.0 < 2.47 - x < 3.05 - 2.8$
	$2.3 > x > 2.22$

$2.25 < x < 2.3$

Examiner's Comments:

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The majority of candidates received full credit on this question by performing a two dimensional consistency test on the table of ILF's provided using either:

- Miccolis' marginal consistency test as illustrated on page 60 of Rosenberg's discussion
- Factor comparison illustrated on page 61 of Rosenberg's discussion

To receive full credit, the candidate should have:

- Calculated either consistency test along both dimensions:
  1. varying occurrence limit while holding aggregate limit constant
  2. varying aggregate limit while holding occurrence limit constant
- Utilized other limits shown – above/below and left/right of missing ILF.

Credit for candidates doing part of the marginal consistency test and part of the factor comparison (subtraction) was given based on how fully the candidate satisfied the above criteria for full credit. For example, varying the occurrence limit under both tests received less credit than varying the occurrence limit under one test and varying the aggregate limit under the other test.

It was acceptable but not required to cap the upper limit at 2.47 based on the factor for the \$500K Aggregate/\$50K Occurrence limit provided in the table.
Both strict and non-strict inequalities were equally acceptable.

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