2. (1.5 points)

A multi-dimensional credibility technique has been developed to predict claim frequencies for major permanent partial claims.

- **Seven years of data were collected.**
- **The technique produced a raw predicted relativity based on the oldest five years.**
- **The most recent two years were used as the holdout sample.**

Major Permanent Partial Claims			
Quintile	Holdout Sample Relativity	Prediction Based on Raw	Prediction Based on Credibility Procedure
1	0.6	0.3	0.4
2	0.8	0.5	0.7
3	1.0	1.1	1.0
4	1.2	1.9	1.5
5	1.4	3.0	1.8

Demonstrate whether the credibility technique produces an improved estimate using the sum of squared errors.

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Question 2

Sample 1

Couret and Venter look at sum of squared error for the holdout relativity next to three things:

1) Total hazard group relativity
2) Prediction based on raw data
3) Prediction based on credibility procedure

1) Sum of squared error = $(1 - 0.6)^2 + (1 - 0.8)^2 + (1 - 1)^2 + (1 - 1.2)^2 + (1 - 1.4)^2 = 0.4$
2) Sum of squared error = $(0.3 - 0.6)^2 + (0.5 - 0.8)^2 + (1.1 - 1)^2 + (1.9 - 1.2)^2 + (3 - 1.4)^2 = 3.24$
3) Sum of squared error = $(0.4 - 0.6)^2 + (0.7 - 0.8)^2 + (1 - 1)^2 + (1.5 - 1.2)^2 + (1.8 - 1.4)^2 = 0.3$

Since #3 produces the lowest sum of squared errors, the credibility procedure is an improvement over #1 (hazard group membership) and #2 (using actual data).

Sample 2

SSE for Raw = $(\text{raw} - \text{holdout})^2$

$= (0.3 - 0.6)^2 + (0.5 - 0.8)^2 + (1.1 - 1)^2 + (1.9 - 1.2)^2 + (3 - 1.4)^2 = 3.24$

SSE for Cred Proc = $(\text{cred} - \text{holdout})^2$

$= (0.4 - 0.6)^2 + (0.7 - 0.8)^2 + (1 - 1)^2 + (1.5 - 1.2)^2 + (1.8 - 1.4)^2 = 0.3$

Yes, the credibility technique produces a lower SSE when compared to holdout (0.3) than the raw data (SSE of 3.24).