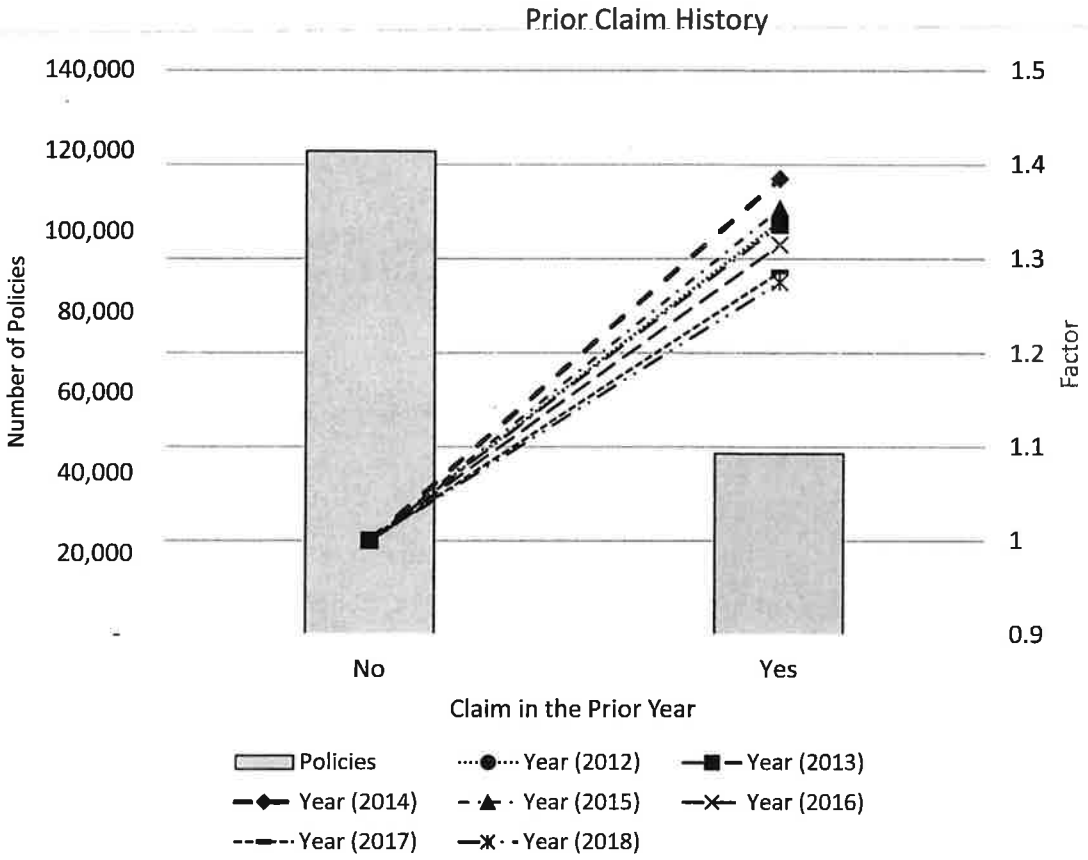
10. (1.75 points)

The following graph shows pure premium relativities produced by a generalized linear model (GLM). The variable indicates whether the risk has had a claim in the most recent prior year or not.



a. (0.5 point)

Describe the type of test for which the above graph is used.

b. (0.25 point)

Briefly state the conclusion that can be drawn from the above graph, using the test described in part a.

c. (1 point)

Describe two other tests to consider when evaluating the inclusion of this variable in the model.

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QUESTION 10	
TOTAL POINT VALUE: 1.75	**LEARNING OBJECTIVE(S): A8**
SAMPLE ANSWERS	
Part a: 0.5 point	
Sample 1 The graph shows the Consistency Test. It checks the result of the GLM to see if all the years have a consistent slope and are consistent over the years. *Sample 2* Consistency Test. Tests the model for various years to see if the prediction/estimates are consistent over time. *Sample 3* Consistency Test. The test looks at the pattern of the relativity over several years to see if the variable is statistically significant to use in the model. *Sample 4* The test is to verify that the relativities are stable when you examine them across many individual years. *Sample 5* To answer whether the presence of claims will have a significant impact on individual rates. In addition, the graph will provide insight on how similar the impact is among different years.	
Part b: 0.25 point	
Sample 1 The relativities of having a claim history for all years are consistent. *Sample 2* The trend is consistent over the years. The upward line suggests the existence of claim in the prior year is correlated with higher losses. So reasonable to include the claim in the prior year in the model. *Sample 3* The lines are trending upward consistently indicating that the variable is significant and reliable to include in the model.	
Part c: 1.0 point	
Any two of the following: Statistical Test – Look at the Chi-square test to test the null hypothesis. A chi-square test p-value less than 5% shows the null hypothesis should be rejected and the variable is predictive and should be included in the model. (Similar answers for T-test or F-Test.) Judgmental – Check to see if the relativities make common sense and is intuitive. Standard Error Test – If the range around the estimate is wide, it may not be statistically significant. If the intervals are tight then the variable should be included.	

EXAMINER'S REPORT

Candidates were expected to know the GLM consistency test graph, what it represents, and two other tests used in assessing whether to include a variable in the GLM or not.

Part a

Candidates were expected to know that the graph is used for the consistency test and that it reflects a stable variable to use in the GLM.

Common mistakes included:

- Not knowing what the graph represents and what it is used for
- Stating that the graph was evaluating whether a variable should be included, without any mention of consistency over years

Part b

Candidates were expected to assess what specific graph reflected – consistency of the shape/slope.

Common mistakes included:

- Not knowing the use of the graph
- Stating that the pattern was not consistent/stable because the slopes were not relatively similar

Part c

Candidates were expected to demonstrate knowledge of two other tests used in evaluating whether a variable is appropriate to include in the GLM or not.

Common mistakes included:

- Listing tests that are not used in evaluating a variable's appropriateness
- Listing tests generally used for assessing the appropriateness of the GLM as a whole (not a specific variable)
- Not providing the correct explanation for a specific test they listed
- Mixing the name of a type of test with the explanation for a different type of test