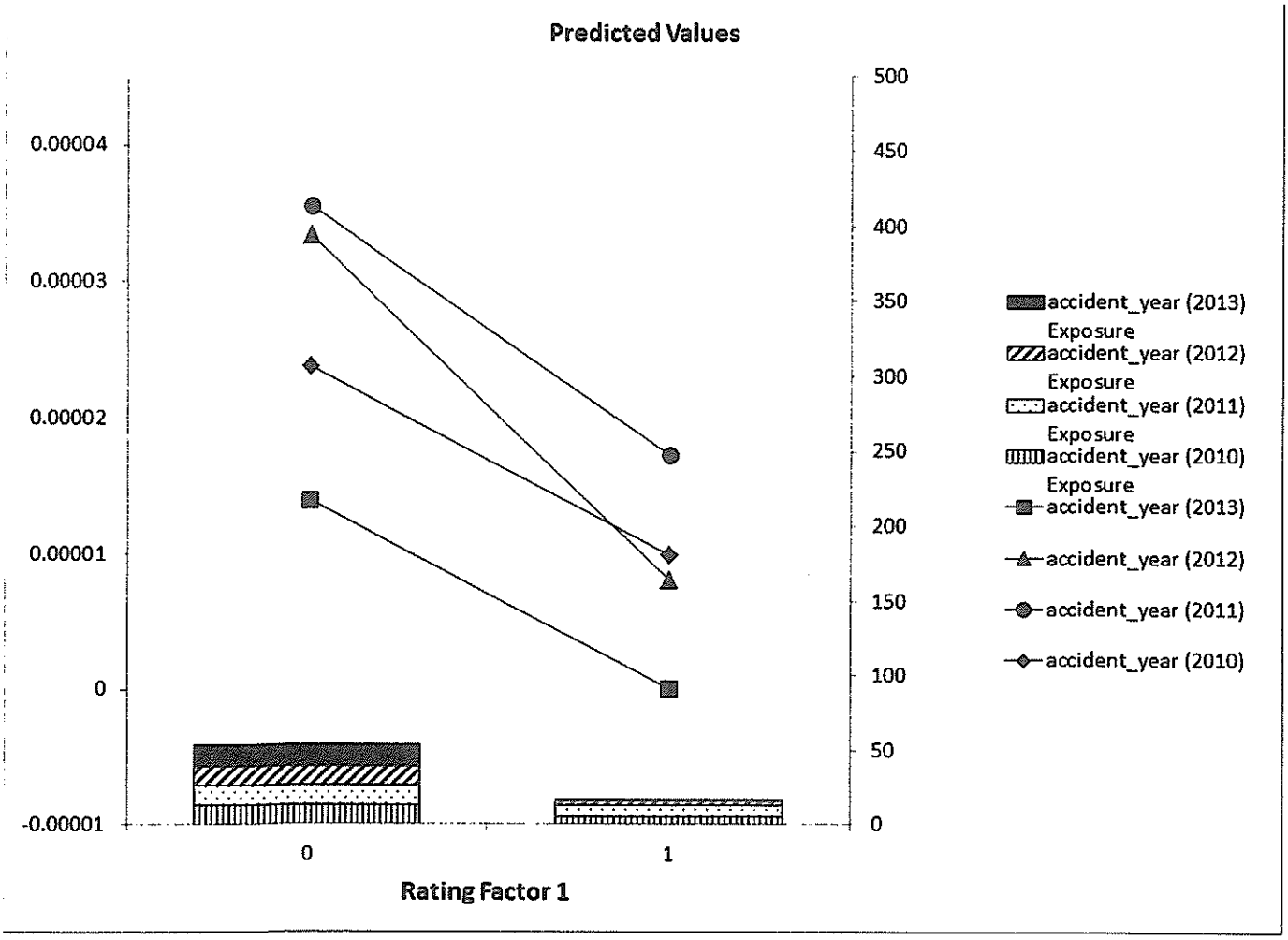
12. (1 point)

The following graph provides the output from a generalized linear model (GLM):



a. (0.5 point)

Briefly explain whether this variable should be included in the rating plan.

b. (0.5 point)

Briefly discuss two reasons why GLM analysis is typically performed on loss cost data instead of loss ratios.

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QUESTION 12	
TOTAL POINT VALUE: 1	**LEARNING OBJECTIVE: A8**

SAMPLE ANSWERS

Part a: 0.5 point

Sample Answer 1

Yes. It seems that all years exhibit similar downward slope for this rating factor. So it seems the rating variable has predictive power

Sample Answer 2

The 4 years all show a consistent indication, just as various levels. 2012 appears to have a larger changes to factor 1. The indication between rating factors is very small, the exposure for factor 1 is also very low. Even though somewhat consistent by AY, the lack of volume in factor 1 exposure and the minor change between variables, I would not include in plan.

Sample Answer 3

The variable should be included.
While the exposure for level 1 seems low, the loss cost estimates show a clear and significant differential, consistent from 2010-2013. Level 1 is significantly lower in loss cost compared to level 0.

Sample Answer 4

Even though there appears to be predictive value for this variable based on the decreasing trend for all AYs, there is not enough exposure in each group for this to be credible (only ~20 exposures total per AY). Do not include.

Part b: 0.5 point

Sample Answer 1

1) No need to on-level premiums, which can be difficult at the granular level
2) There is no standard probability distribution for loss ratios

Sample Answer 2

1) Experienced actuaries typically have preconceived ideas of what frequency of severity to expect; not the same can be said for loss ratios
2) There are no typical "go-to" models for loss ratios, unlike loss cost (Poisson frequency with Gamma severity)

Sample Answer 3

1) Loss ratios include a variety of extra pieces such as UW expenses and target UW profit that are prone to change and could impact the analysis
2) In addition, Loss Cost data is often available from industry resources such as NCCI, allowing to test across the market as a whole instead of a particular book

Sample Answer 4

1) Actuaries often have an a-priori expectation of frequency and severity trends but not necessarily loss ratio trends. So the actuary can check to see if the model results match this initial expectation with the loss cost data but not loss ratio data.
2) Loss cost data allows the actuary to gain insight into the claims process by separating out severity from frequency. This cannot necessarily be done with loss ratio data.

EXAMINER'S REPORT

Part a

Candidates were expected to recognize the consistent downward pattern across accident years between two levels in this consistency test of Rating Variable 1. Full credit was given to responses that identified this pattern which indicates potential predictive power, even if they would choose not to include it in a rating plan due to one or several confounding factors.

A common mistake was focusing on absolute values rather than relativities or trends

Part b

Candidates were expected to recall two reasons that Actuaries generally model loss costs instead of loss ratios in GLMs

Common mistakes included:

- Focusing on advantages of GLMs over univariate methods.
- Giving same reason twice