5. (2.25 points)

A GLM has been used to develop an insurance rating plan. The results are given below:

Risk	Model Predicted Loss	Actual Loss
1	2,000	2,050
2	500	220
3	1,500	1,480
4	800	850
5	200	400

a. (1.75 points)

Plot the Lorenz curve for this rating plan. Label each axis and the coordinates of each point on the curve.

b. (0.5 point)

Briefly describe how the Gini index is calculated and what the Gini index measures when applied to an insurance rating program. Do not calculate the Gini index.

CONTINUED ON NEXT PAGE

QUESTION: 5

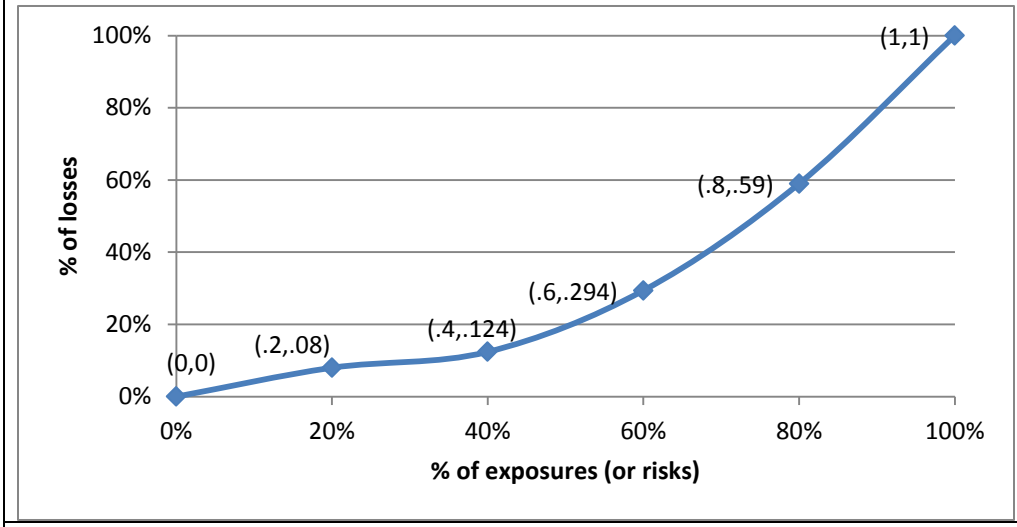
TOTAL POINT VALUE: 2.25 | **LEARNING OBJECTIVE(S): A4**

SAMPLE ANSWERS

Part a: 1.75 points

Sample 1

Order	Risk	Model Predicted Loss	% Exposure	Actual Loss	% Actual Loss
1	5	200	0.2	400	0.08 (=400/5000)
2	2	500	0.4	220	0.124 (=620/5000)
3	4	800	0.6	850	0.294
4	3	1500	0.8	1480	0.59
5	1	2000	1.0	2050	1.00
Total		5000		5000	



Part b: 0.5 point

- The Gini index is twice the area between the Lorenz curve and the line of equality, where the line of equality is the straight line from the point (0,0) and (1,1) and represents where each exposure has the same expected loss.
  The Gini index measures the ability of the rating plan to differentiate between the best and worst risks, i.e. lift of the insurance plan.
- Gini index is calculated as 2 times the area between the diagonal line (line of equality) and Lorenz curve.
  In insurance rating, large Gini index represents stronger risk classification power.
- Gini index is calculated as 2 times the area between the diagonal line (line of equality) and Lorenz curve.
  It is a measure of the predictive lift of the rating program. Higher Gini index equals more lift and more predictive power.

EXAMINER'S REPORT

Candidates were expected to draw a Lorenz curves given the data, and to know how to calculate and explain the purpose of the Gini index.

Part a

Candidates were expected to calculate cumulative losses and exposures, then plot the Lorenz curve. Candidates were not expected to draw the plot to scale.

Common errors made by candidates were:

- Either not re-ordering the risks, or reordering them incorrectly.
- Using modeled losses on the Lorenz curve as opposed to actual losses.
- Graphing modeled and actual losses, without showing exposure.
- Plotting residuals as opposed to cumulative actual losses.
- Not using the cumulative percentage of loss, instead showing the actual loss for each risk.
- Calculating the percentage of loss off the highest risk instead of the total loss.

Part b

Candidates were expected to describe the Gini index calculation and what it measures.

Common errors made by candidates were:

- Missing the "2 times" the area between the Lorenz curve and line of equality.
- Stating that the Gini index measures how well the predicted losses fit the actual losses.
- Stating that the smaller the index the better the rating plan.
- Stating unclear descriptions.