Reading: NCCI.InformationalExhibits
Model: Source Text
Problem Type: Discretize a severity distribution

Given Per-claim accident severity is modeled using a Uniform distribution on the interval [0, 10].

Find Discretize this severity distribution using evaluation points 0, 1, …, 10.

Solution

For this severity distribution the excess ratio at loss point x_i is given by

$$XS(x_i) = \left(1 - \frac{x_i}{10}\right)^2$$

Alice: "You should check you can derive this – it's a great application of Bahnemann and a primer for IQs."

Now form a table with a row for each of the evaluation points

Evaluation Point, x_i (1)	XS(x_i) (2)	LEV_i (3)	LIL_i (4)	CDF (5)	PDF (6)
0	1.00	0.00	0.00	0.05	0.05
1	0.81	0.95	0.95	0.15	0.10
2	0.64	1.80	0.85	0.25	0.10
3	0.49	2.55	0.75	0.35	0.10
4	0.36	3.20	0.65	0.45	0.10
5	0.25	3.75	0.55	0.55	0.10
6	0.16	4.20	0.45	0.65	0.10
7	0.09	4.55	0.35	0.75	0.10
8	0.04	4.80	0.25	0.85	0.10
9	0.01	4.95	0.15	0.95	0.10
10	0.00	5.00	0.05	1.00	0.05

Notes

(2) = (1 - (1) / 10)^2

(3) = [1 - (2)] * (Average Unlimited Severity)

Alice: "The Average Unlimited Severity is just E[X]."

(4) = $LEV_i - LEV_{i-1}$

(5) = 1 - LIL_{i+1} / ($x_{i+1} - x_i$)

Alice: "Notice $LEV_i \le x_i$ *and* $LEV_i - LEV_{i-1} \ge LEV_{i+1} - LEV_i$. *i.e.* LIL_i *is a decreasing function of* x_i *"*