Old Quiz 4

3) Members of four classes of insured can have 0 or 1 claims, with the following probabilities.

	Number of	claims	W	
class	0	1	$\mu(\theta)$	$v(\theta)$
I	0.9	0.1	0.1	0.09
II	0.8	0.2	0.2	0.16
III	0.5	0.5	0.5	0.25
IV	0.1	0.9	0.9	0.09

$= (1-0)^2 .8(.2)$ Bernoulli shortcut

A class is chosen at random, with probability 0.25, and four insureds are selected from this class. The total number of claims from the four insureds is two. (Get $\overline{X}$ from this information.)

If five insureds are selected at random from the same class, estimate their total number of claims using Buhlmann Straub credibility, that is, determine P, the Buhlmann Straub credibility estimate of the total number of claims for the 5 randomly selected insureds. (You need to compute $\mu(\theta)$ and $v(\theta)$ for class II.) $n = 4$

$\bar{X} = \frac{2}{4} = 0.5$ claims per person

$\mu = E[\mu(\Theta)] = \frac{1}{4}(.1 + .2 + .5 + .9) = 0.425$

$v = E[v(\Theta)] = \frac{1}{4}(0.09 + 0.16 + 0.25 + 0.09) = 0.1475 = \frac{.59}{4}$

$a = V[\mu(\Theta)] = E(w^2) - \mu^2 = \frac{1}{4}[(.1)^2 + (.2)^2 + (.5)^2 + (.9)^2] - (0.425)^2$

$= \frac{1.11}{4} - (0.425)^2 = 0.096875$

$k = \frac{v}{a} = \frac{0.1476}{0.096875} = 1.5226$

$Z = \frac{n}{n+k} = \frac{4}{4 + 1.5226} = 0.7243 = \frac{na}{na+v} = \frac{.3875}{.535}$

$P_c = 5[\mu + Z(\bar{X} - \mu)] =$

$5[0.425 + 0.7243(0.5 - 0.425)]$

$= 5(0.4793) = \boxed{2.3966}$

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