Math 404 HW 11 Spring 2024. Due **Tuesday**, April 30. Exam 3 is Thursday, April 25. The final is Monday, May 6, 8-10 AM in the morning in EGRA 322 (usual class room).

1) Members of three classes of risks can have 0, 1, or 2 claims, with the following probabilities.

	Number	of	claims
class	0	1	2
I	0.5	0.3	0.2
II	0.7	0.2	0.1
III	0.9	0.1	0

A class is chosen at random, and varying numbers of risks from that class are observed for three years.

year	number of risks	number of claims
1	10	3
2	20	5
3	30	10

Determine P, the Buhlmann Straub credibility estimate of the number of claims in year 4 for 40 risks from the same class.

Hint: the prior is 1/3 for each class. Find $\mu(\theta) = \mu_i$ = mean of each class and $v(\theta) = V(X|i)$ = variance of each class. Use the second table to find $\overline{X}$. Then find μ, v, a, Z and 40 P_C^1. Formulas are similar to 136) and 143).

2) For this problem follow notes 76)-77) from week 13, and see exam 3 review 145). Let the line $Y = a + \delta x$ be $Y = 4.7534 + 0.1085x$.

accident year	x=year−2003	lost cost	ln(lost cost)
2003	0	119.39	4.782
2004	1	133.97	4.897
2005	2	129.89	4.867
2006	3	158.57	5.066
2007	4	188.72	5.240

a) Find the 2007 loss cost projected to Sept. 1, 2009 using projected cost = e^Y. Hint: find x, then find Y. The answer will not change from that in the notes.

b) Find the 2007 loss cost projected to Sept. 1, 2009 using projected cost = (2007 experience lost cost) $e^{\delta t}$ where the 2007 experience lost cost is found from the above table.

Hint: also t is one less than the t in the notes that used the 2006 loss cost projected to Sept. 1, 2009

expected dollar losses in effective period (trended and developed)	30,000,000
earned exposure units	900,000
earned premium at current rates	40,500,000
present average manual rate	45
permissable loss ration = 1− expense ratio	0.7

3) Using the above table and "Exam 3 review" 146) and the example under 146), find the new average gross rate using

a) the loss cost method and

b) the loss ratio method.

4) Suppose $X \sim$ exponential(θ). If $\hat{\theta} = 500$, estimate the loss elimination ratio LER(120) if there is a deductible of 120.

Exam C problems, Buhlmann Straub 21,50,72,139,233,263