STA 2492: CREDIBILITY THEORY AND LOSS MODELS

a) You are given that the annual number of claims for an insured has probability function

$$p(x) = \binom{3}{x} q^x (1-q)^{3-x} \; x = 0,1,2,3.$$

The prior density is $\pi(q) = 2q \qquad 0 < q < 1$

A randomly chosen insured has zero claims in year 1. Using Buhlmann credibility, estimate the number of claims in year 2 for the selected insured. [5marks]

b) Compound Poisson distribution has $\lambda = 5$ and claim amount distribution amount distribution as

X	$P(x)$
100	0.80
500	0.16
1000	0.04

Calculate the probability that aggregate claims will be exactly 600. (5 marks)

c) For a portfolio of policies, you are given

i) The annual claim amount on a policy has probability density function

$$f\left(x/\theta\right) = \frac{2x}{\theta^2} \qquad 0 < x < \theta$$

ii) The prior distribution of θ has density function $\pi(\theta) = 4\theta^3 \qquad 0 < \theta < 1$

iii) A randomly selected policyholder had claim amount 0.1 in year 1.

Determine the Buhlmann credibility estimate of the claim amount for the selected policy in year 2

d) The total claims for two policyholders are given below.

Policyholder	Year			
	1	2	3	4
X	730	800	650	700
Y	655	650	625	750

Using the Nonparametric Empirical Bayes method, determine the Buhlmann credibility premium for the policyholder Y.

$? \cdot x^2 \quad 2x^?$