# ACSC/STAT 4703, Actuarial Models II

## FALL 2021
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### Homework Sheet 7

### Due: Tuesday 29th November: 11:30 AM

## Basic Questions

1. An insurance company has the following data on its policies:

| Policy limit | Losses Limited to | | | | |
|---|---|---|---|---|---|
| | 50,000 | 100,000 | 500,000 | 1,000,000 | 2,000,000 |
| 50,000 | 1,530,830 | | | | |
| 100,000 | 4,236,478 | 5,968,290 | | | |
| 500,000 | 8,902,580 | 11,390,503 | 15,326,389 | | |
| 1,000,000 | 16,039,008 | 21,772,940 | 28,904,475 | 31,059,321 | |
| 2,000,000 | 7,296,309 | 8,930,244 | 11,405,698 | 12,699,215 | 13,014,384 |

Use this data to calculate the ILF from \$50,000 to \$2,000,000 using

(a) The direct ILF estimate.

(b) The incremental method.

2. For a certain line of insurance, the loss amount per claim follows an inverse Pareto distribution with parameters $\tau = 3$ and $\theta$. If the policy has a deductible per loss set at $0.2\theta$ and a policy limit set at $2\theta$ (for the current value of $\theta$), by how much will the expected payment per loss increase if there is inflation of 8%?

3. An insurance company charges a risk charge equal to the square of the average loss amount, divided by 100,000. It has the following data on a set of 1750 claims from policies with limit \$1,000,000.

| Losses Limited to | 100,000 | 200,000 | 500,000 | 1,000,000 |
|---|---|---|---|---|
| Total claimed | \$8,593,790 | \$12,893,225 | \$20,390,588 | \$23,406,631 |

Calculate the ILF from \$100,000 to \$1,000,000.

## Standard Questions

4. An insurer sets its premium for an insurance contract with policy limit 500,000 as the expected payment plus a 10% loading, plus a risk charge equal to the square of the expected payment divided by 100,000. A reinsurer offers reinsurance of 500,000 over 500,000 for a loading of 25%. By

reinsuring losses above 500,000, the insurer sets its ILF from 500,000 to 1,000,000 at 1.34. If the payments on the policy are as expected, then the reinsurer makes a net profit (i.e. profit based on payments only, not including other costs) of \$230 per policy. What is the premium for the policy with limit \$500,000?

5. An insurer sells policies with limits \$1,000,000 and \$2,000,000. The trend factor for losses limited to \$1,000,000 is 1.036. The insurer's loading for policies with limit \$1,000,000 is 20%. For policies with limit \$2,000,000, the insurer buys reinsurance from a reinsurer who charges a loading of 30%. The ILF from \$1,000,000 to \$2,000,000 increases from 1.41 in 2020 to 1.46 in 2021. What is the trend factor for losses limited to \$2,000,000?