

Math 404 HW 1 Spring 2024. Due Thursday, Jan. 25. **1 page 6 questions.**

course webpage: <http://parker.ad.siu.edu/Olive/M404.html>

Place your solutions on a separate sheet of paper. DO NOT place solutions side by side. You may use both the front and the back of each sheet.

Google “soa exam c sample questions” to Exam C Sample Questions (200 pages) and Solutions (107 pages). Sometimes HW problems will come from these questions. These pages are modified sometimes.

From www.soa.org: click on Education & Exams, then the Associate of the Society of Actuaries (ASA), then scroll down and click on Advanced Short-Term Actuarial Mathematics (ASTAM) Exam, then the Advanced Short-Term Actuarial Mathematics (ASTAM) Exam Study page. This webpage will also have questions and solutions.

For Math 403 type questions, click on Fundamentals of Actuarial Mathematics (FAM) Exam, then the FAM Exam Study page where the FAM-S problems are for Math 403.

YOU ARE BEING GRADED FOR WORK NOT JUST THE FINAL ANSWER. As a rule of thumb, you should have some idea of what you were doing, even without the book or notes. You are encouraged to form groups to discuss ideas and HW problems, but do not copy.

Assume $X \geq 0$ unless told otherwise.

1) Suppose $X \sim$ single parameter Pareto(α, θ). If $\hat{\alpha} = 2$ and $\hat{\theta} = 100$, estimate the loss elimination ratio LER(200) if there is a deductible of 200.

2) Suppose $X \sim$ two parameter Pareto(α, θ). If $\hat{\alpha} = 2$ and $\hat{\theta} = 100$, estimate the loss elimination ratio LER(200) if there is a deductible of 200.

3) Suppose $X \sim$ Pareto(α, θ). If $\hat{\alpha} = 1$ and $\hat{\theta} = 1000$, for $x > 0$, estimate

a) $F(x)$

b) $h(x)$.

Hint: Use $\hat{f}(x) = \frac{d}{dx} \hat{F}(x)$.

4) Suppose $X \sim EXP(\theta)$ with $\hat{\theta} = 1000$. If the deductible $d = 500$, estimate

a) $E(Y^P)$

b) $E(Y^L)$.

5) Suppose N_1, \dots, N_n are iid Poisson(λ) with $\bar{N} = \hat{\lambda} = 5$. Estimate a) $P(N = 0)$ and b) $P(N = 1)$.

(Use at least four digits after leading zeros, eg 0.03401.)

6) Suppose $X \sim LN(\mu, \sigma)$ with $\hat{\mu} = 5.3949$ and $\hat{\sigma}^2 = 1.1218$. Estimate $E(X \wedge 500)$.

Hint: See Exam C Question 6 from the second paragraph of this handout. Note that $\hat{\sigma} = \sqrt{\hat{\sigma}^2}$.