

# Homework 10, Math 477, Fall 2018

Eric A. Carlen  
Rutgers University

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**Instructions** Do all of these problems – at least – but neatly write up and turn in *only* those that are marked with a \*, including the first one below:

**1\*** Let  $\{X_j\}_{j \in \mathbb{N}}$  be an independent, identically distributed sequence of random variables that are Poisson with parameter 1.

(a) Compute  $p(\lambda) = \ln(\mathbb{E}(e^{\lambda X_1}))$ , and then compute

$$s(x) := \sup_{\lambda > 0} \{\lambda x - p(\lambda)\} .$$

(b) Let  $\bar{X}_N$  denote the sample mean. Use Cramér's Theorem to estimate  $P(\bar{X}_N \geq 1.02)$  for  $N = 10^4$ ,  $N = 10^5$  and  $N = 10^6$ .

**From the Problems in Chapter 8:** 6\*, 7, 11\*, 20

**From the Problems in Chapter 9:** 4\* , 10\*