

# Math 201, Spring 2020

## Problem Set # 8

Due March 30, 2022 at 11:59pm on gradescope

**Question 1.** Estimate the probability that out of 10,000 poker hands (of 5 cards) we will see at most two four of a kinds. Use either the normal or the Poisson approximation, whichever is appropriate. Justify your choice of approximation.

**Question 2.** Let  $X \sim \text{Exp}(\lambda)$ . Note: for each part, you will not earn points if you do not use the method indicated.

(a) Use integration by parts to show the reduction formula:

$$\int_0^{\infty} x^n \lambda e^{-\lambda x} dx = \frac{n}{\lambda} \int_0^{\infty} x^{n-1} \lambda e^{-\lambda x} dx \quad \text{for } n \geq 1.$$

(b) Use the formula from part (a) to compute  $E(X^3)$ .