

1 Fishy Computations

Use the Poisson distribution to answer these questions:

- (a) Suppose that on average, a fisherman catches 20 salmon per week. What is the probability that he will catch exactly 7 salmon this week?
- (b) Suppose that on average, you go to Fisherman's Wharf twice a year. What is the probability that you will go at most once in 2018?
- (c) Suppose that in March, on average, there are 5.7 boats that sail in Laguna Beach per day. What is the probability there will be *at least* 3 boats sailing throughout the *next two days* in Laguna?

2 Geometric and Poisson

Let $X \sim \text{Geo}(p)$ and $Y \sim \text{Poisson}(\lambda)$ be independent random variables. Compute $\mathbb{P}(X > Y)$. Your final answer should not have summations.

3 Variance

A building has n upper floors numbered $1, 2, \dots, n$, plus a ground floor G . At the ground floor, m people get on the elevator together, and each person gets off at one of the n upper floors uniformly at random and independently of everyone else. What is the *variance* of the number of floors the elevator *does not* stop at?

4 Probabilistically Buying Probability Books

Chuck will go shopping for probability books for K hours. Here, K is a random variable and is equally likely to be 1, 2, or 3. The number of books N that he buys is random and depends on how long he shops. We are told that

$$\mathbb{P}[N = n|K = k] = \begin{cases} \frac{c}{k} & \text{for } n = 1, \dots, k \\ 0 & \text{otherwise} \end{cases}$$

for some constant c .

- (a) Compute c .

- (b) Find the joint distribution of K and N .

- (c) Find the marginal distribution of N .