## Tutorial 8

## Ch. 4 and 5

Nov. 11

Summary of the discrete distributions:

| $\boldsymbol{X}$ | $X$ Counts | $p(x) \quad V$ | Values of X | $E(x)$ | $V(x)$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Binomial | Number of sucesses in $n$ fixed trials | $\binom{n}{x} p^{x}(1-p)^{n-x}$ | $x \mathrm{x}=0,1, \ldots, n$ | $n p$ | $n \mathrm{n}(1-\mathrm{p})$ |
| Poisson | Number of arrivals in a fixed time period | $\frac{e^{-\lambda} \lambda^{x}}{x!}$ | $x=0,1,2, \ldots$ | $\lambda$ | $\lambda$ |
| Geometric | Number of trials up through 1st success | $(1-p)^{x-1} p$ | $x=1,2,3, \ldots$ | $\frac{1}{p}$ | $\frac{1-p}{p^{2}}$ |
| Negative <br> Binomial | Number of trials up through kth success | $\binom{x-1}{k-1}(1-p)^{x-k} p$ | $p^{k} \quad x=k, k+1, \ldots$ | $\frac{\mathrm{k}}{\mathrm{p}}$ | $\frac{\mathrm{k}(1-\mathrm{p})}{\mathrm{p}^{2}}$ |
| Hyper geometric | Number of marked individuals in sample taken without replacement | $\frac{\binom{M}{x}\binom{N-M}{n-x}}{\binom{N}{n}}$ | $\begin{aligned} & \max (0, M+n-N) \\ & \leq x \leq \min (M, n) \end{aligned}$ | $n * \frac{M}{N}$ | $\frac{n M(N-M)(N-n)}{N^{2}(N-1)}$ |

## Chapter 4 Example 9c page 157

Find the expected value of the sum obtained when n fair dice are rolled.

## Chapter 5 Problem 5.1 page 212

$$
f(x)= \begin{cases}c\left(1-x^{2}\right) & -1<x<1 \\ 0 & \text { otherwise }\end{cases}
$$

a. What is the value of $c$ ?
b. What is the cumulative distribution function?

## Suggested Problem

Find the cumulative distribution function of the following density:

$$
f(x)= \begin{cases}x & 0<x<1 \\ 1 & 1 \leq x<1.5 \\ 0 & \text { otherwise }\end{cases}
$$

