# Midterm review

| Names and Parameters | Values | $\boldsymbol{P(X = k)}$ | $\boldsymbol{E(X)}$ |
|---|---|---|---|
| Bernoulli($p$)/Indicator | $0, 1$ | $P(X = 1) = p$ | $p$ |
| Binomial$(n, p)$ | $0, 1, 2, \dots, n$ | $\binom{n}{k} p^k (1-p)^{n-k}$ | $np$ |
| Hypergeometric (N, G, n) | $0, 1, 2, \dots, n$ | $\dfrac{\binom{G}{k}\binom{N-G}{n-k}}{\binom{N}{n}}$ | $n\dfrac{G}{N}$ |
| Poisson($\mu$) | $0, 1, 2, \dots$ | $e^{-\mu}\dfrac{\mu^k}{k!}$ | $\mu$ |
| Geometric($p$) | $1, 2, 3, \dots$ | $(1-p)^{k-1}p$ | $\dfrac{1}{p}$ |

## Note that:

- Unless otherwise stated, dice have six sides and are fair, and coins have two distinct coins and are fair, cards are dealt without replacement.
- "at random" means equally likely

- i.i.d: independent and identically distributed
- SRS: simple random sample
- pmf: probability mass function
- cdf: cumulative distribution function

## Note that:

- When you study, verbalize. Try to describe the problem in words. Make sure you understand what the problem is asking for, and you understand what information you are given. For instance, the difference between waiting times and binomial random variable

- Draw pictures!! Draw pictures!!

- Do NOT assume independence!! Either the problem has to provide an assumption of independence, or the assumption has to follow from the conditions of the experiment, e.g. sampling with replacement

# During the exam

- Start with the easy questions. When you open the midterm, skim through it quickly and mark the questions that are easy to answer and do those first. Not only will this help you maximize your scoring potential but it will also bolster your confidence. Once you are done with answering the easy questions, it's time to tackle the ones you skipped. Don't over-think straightforward questions.

- Read each question carefully. As you know, assumptions matter. If you have misread those then your solution will be off. For example, confusing with and without replacement is a big problem. Also: "the fourth head is on the $20^{th}$ toss" and "four heads in 20 tosses" are quite different.

# During the exam

- Forcing yourself to read slowly, underlining key assumptions as you read, is important for doing well. If you are done with the test, check your work by reading each question afresh and solving it again instead of just reading over your answer.

- Provide reasoning or a calculation in **all** questions. If you did a calculation in your head, **write out** the calculation you did in your head.

- If an answer is taking you numerous lines of calculation, or complicated algebra/calculus, you've probably missed something. Rethink, or move to a different problem.

- If you don't know how to do a problem, try not to leave it blank. Almost always, you will have an idea of what might be relevant. If you write that, and it is indeed important for the problem, you might get some partial credit. That said, you shouldn't expect partial credit for everything you write. We'll be looking for substantive ideas and progress towards a solution.