

The Erdős-Rényi model is specified by two parameters: the number of vertices in the graph  $n$ , and the probability of an edge  $p$ . Given  $n$  and  $p$ , we choose a graph on  $n$  vertices by including an edge between each pair of vertices with probability  $p$ , independently for each pair. Think of this as flipping a coin with bias  $p$  for each possible edge. I will write  $\mathcal{G}(n, p)$  to denote this distribution,

**Question 1.** What is the expected number of edges in  $\mathcal{G}(n, p)$ ?

**Answer 1.** There are  $\binom{n}{2}$  possible edges and the probability that any given edge appears in the random graph is  $p$ , so by linearity of expectation, the answer is  $\binom{n}{2}p$ .