Goals

• Calculate event probabilities using trees and conditional probabilities
**Probability Questions**

- Midd is in a quidditch series again Skidmore. The first team to win 2 games is the champion.
  - Midd has a $\frac{1}{2}$ chance of winning the first game.
  - If Midd won the previous game, we have a $\frac{2}{3}$ chance of winning the next game.
  - If Midd lost the previous game, we have a $\frac{1}{3}$ chance of winning the next game.
- What is the probability that Midd is the Champion?
Percolation Question

- $a, b, c$ are each present with probability $1/3$.

What is the sample space?

What is the probability of the graph being connected? (A graph is connected if there is an path – not necessarily an edge – between every pair of vertices.) (Use a tree!)
**Percolation Question**

- $a, b, c$ are each present with probability $\frac{1}{3}$.

What is the sample space? $\{\{a, b, c\}, \{a, b\}, \{a, c\}, \{a\}, \{b, c\}, \{b\}, \{c\}, \emptyset\}$

Probability the graph is connected? $\Pr(\{a, b, c\} + \Pr(\{a, b\}) + \Pr(\{b, c\}) + \Pr(\{a, c\}) = \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} + \frac{1}{3} \times \frac{1}{3} \times \frac{2}{3} + \frac{2}{3} \times \frac{1}{3} \times \frac{1}{3} + \frac{1}{3} \times \frac{2}{3} \times \frac{1}{3} = \frac{7}{27}$.
**Percolation Question**

If we label edges of a graph $1, 2, 3, \ldots, M$ and include each edge with probability $p$. What is the probability that just the edges $1, 2, \text{ and } 3$ are present.

What is the probability that any three edges are present?