

## 24.118: Paradox and Infinity

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1. (a)  $P(\text{One red ball}) = \text{stuff}$

(b)  $P(\text{Exactly two heads}) = \frac{\text{number of ways to get two heads}}{\text{number of possible outcomes of five flips}} = \frac{\binom{5}{2}}{2^5} = \frac{10}{32}$

- (c) The outcomes are equally likely. A specific ordering of ten coin flips, regardless of the flip results, has probability  $\frac{1}{2^{10}}$  of appearing.

(d)  $P(\text{No aces}) = \frac{\text{number of ways to get no aces}}{\text{number of possible card hands}} = \frac{\binom{48}{5}}{\binom{52}{5}} = \frac{35673}{54145} \approx 0.658$

$$P(\text{One ace}) = \frac{\text{number of ways to get one ace}}{\text{number of possible card hands}} = \frac{\binom{4}{1}\binom{48}{4}}{\binom{52}{5}} = \frac{3243}{10829} \approx 0.299$$

$$P(\text{At least two aces}) = 1 - (P(\text{No aces}) + P(\text{One ace})) = 1 - \left( \frac{35673}{54145} + \frac{\binom{4}{1}\binom{48}{4}}{\binom{52}{5}} \right) \approx 0.041$$