# Homework 0 - Introduction to Probabilistic Graphical Models

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## 1 Probability

1. A fair coin is tossed 10 times. The sample space for each trial is Head, Tail and the trials are independent. What is the probability of having:

$$P(H) = \frac{1}{2}, \quad P(T) = \frac{1}{2}$$

The probability of getting exactly $k$ heads is given by the binomial distribution:

$$P(X = k) = \binom{n}{k} p^k (1-p)^{n-k}$$

where $n = 10$ and $p = \frac{1}{2}$.

(a) Zero Tail

$$P(0T) = \binom{10}{0} \left(\frac{1}{2}\right)^0 \left(\frac{1}{2}\right)^{10} = \frac{1}{1024}$$

(b) 6 heads

(c) At least three heads

(d) At least three Heads given the first trail was a Head!