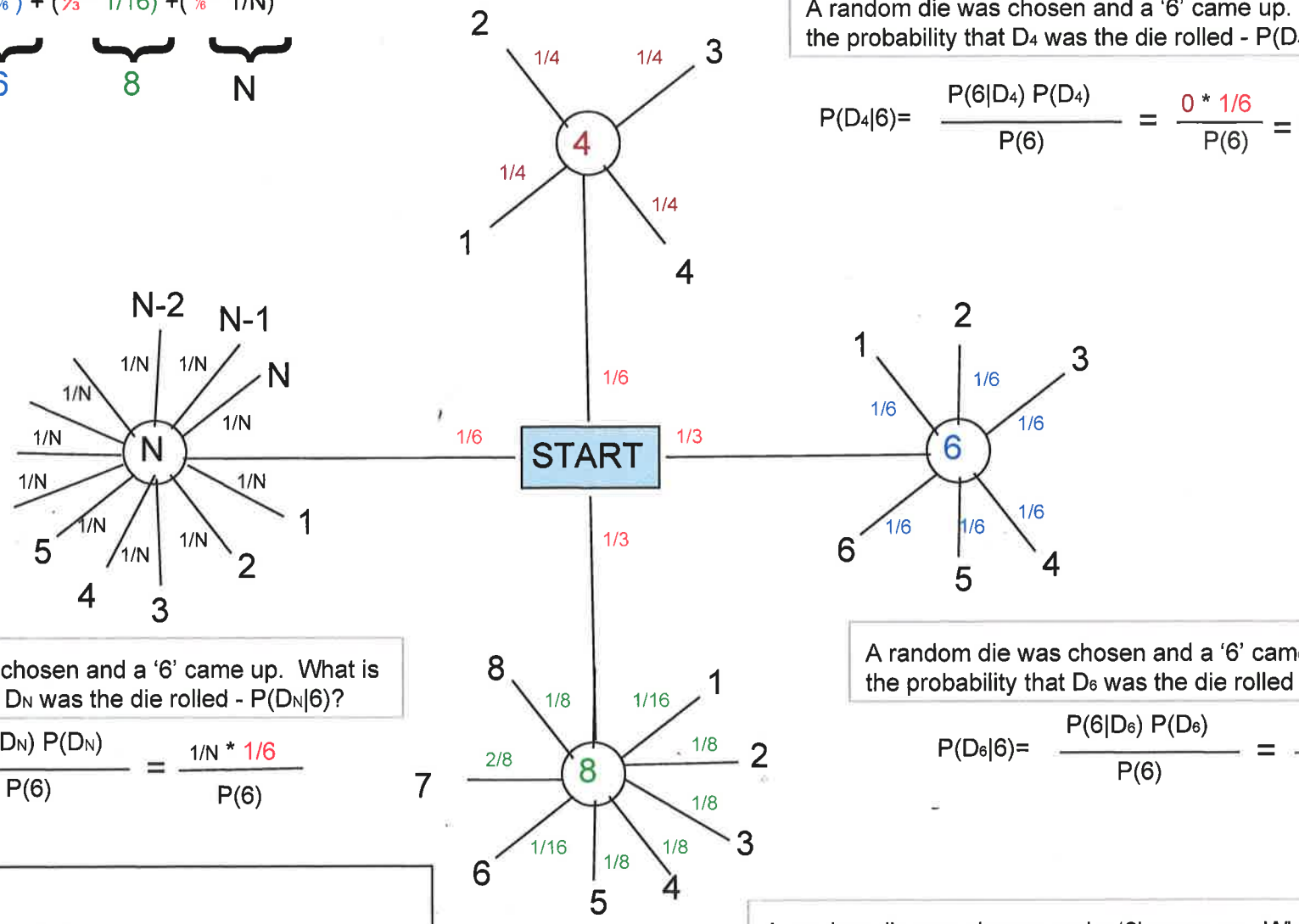
Bayesian Dice

Probability of rolling a '6' (die chosen at random)...

$P(6) = (\frac{1}{6} * 0) + (\frac{1}{3} * \frac{1}{6}) + (\frac{1}{3} * 1/16) + (\frac{1}{6} * 1/N)$

4 6 8 N



A random die was chosen and a '6' came up. What is the probability that D_4 was the die rolled - $P(D_4|6)$?

$$P(D_4|6) = \frac{P(6|D_4)\,P(D_4)}{P(6)} = \frac{0 * 1/6}{P(6)} = 0$$

A random die was chosen and a '6' came up. What is the probability that D_N was the die rolled - $P(D_N|6)$?

$$P(D_N|6) = \frac{P(6|D_N)\,P(D_N)}{P(6)} = \frac{1/N * 1/6}{P(6)}$$

A random die was chosen and a '6' came up. What is the probability that D_6 was the die rolled - $P(D_6|6)$?

$$P(D_6|6) = \frac{P(6|D_6)\,P(D_6)}{P(6)} = \frac{1/6 * 1/3}{P(6)}$$

A random die was chosen and a '6' came up. What is the probability that D_8 was the die rolled - $P(D_8|6)$?

$$P(D_8|6) = \frac{P(6|D_8)\,P(D_8)}{P(6)} = \frac{1/16 * 1/3}{P(6)}$$

NOTE:

$\frac{1}{6} + \frac{1}{6} + \frac{1}{3} + \frac{1}{3} = 1.0$

$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1.0$

$1/16 + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + 2/8 + \frac{1}{8} + 1/16 = 1.0$

$\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = 1.0$

1/N + 1/N.....(N times) = 1.0