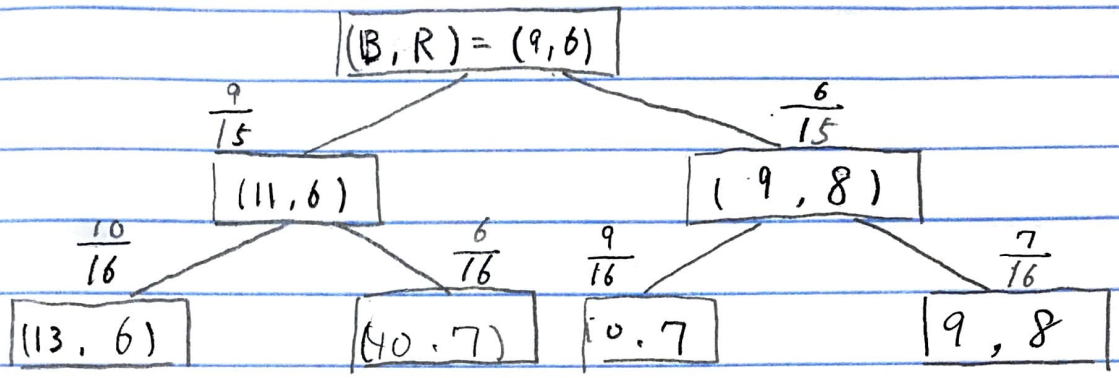
Polya's Urn.

Tree Diagram based on the number of balls in urn.



Red ball's expected value.

$$E[X] = 6\cdot\left(\frac{9}{15}\cdot\frac{10}{16}\right) + 7\cdot\left(\frac{9}{15}\cdot\frac{6}{16}\right) + 7\left(\frac{6}{15}\cdot\frac{9}{16}\right) + 8\cdot\left(\frac{6}{15}\cdot\frac{7}{16}\right)$$

$$= 6\cdot\left(\frac{9}{15}\cdot\frac{10}{16}\right) + 14\cdot\left(\frac{9}{15}\cdot\frac{6}{16}\right) + 8\cdot\left(\frac{6}{15}\cdot\frac{7}{16}\right)$$

$$= 6.8$$

Black ball's expected value.

$$E[X] = 11\cdot\left(\frac{9}{16}\cdot\frac{10}{15}\right) + 10\cdot\left(\frac{9}{15}\cdot\frac{6}{16}\right) + 10\left(\frac{6}{15}\cdot\frac{9}{16}\right) + 9\cdot\left(\frac{6}{15}\cdot\frac{7}{16}\right)$$

$$= 10.2$$