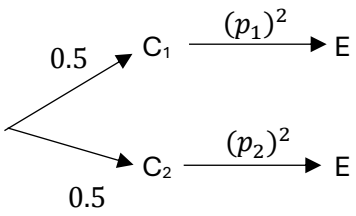
E = "the two tosses are both head"

Strategy A:



$$P(E) = P_{C_1}(E) * P(C_1) + P_{C_2}(E) * P(C_2) = \frac{(p_1)^2 + (p_2)^2}{2}$$

Strategy B:

$$P(E) = p_1 * p_2$$

Let's assume that strategy A is better than strategy B and check if it is true:

$$\frac{(p_1)^2 + (p_2)^2}{2} > p_1 p_2$$

$$(p_1)^2 + (p_2)^2 - 2p_1 p_2 > 0$$

$$(p_1 - p_2)^2 > 0$$

Which is always true since $p_1 \neq p_2$

Therefore, the best strategy to maximize the probability of the event *E* is **strategy A**.