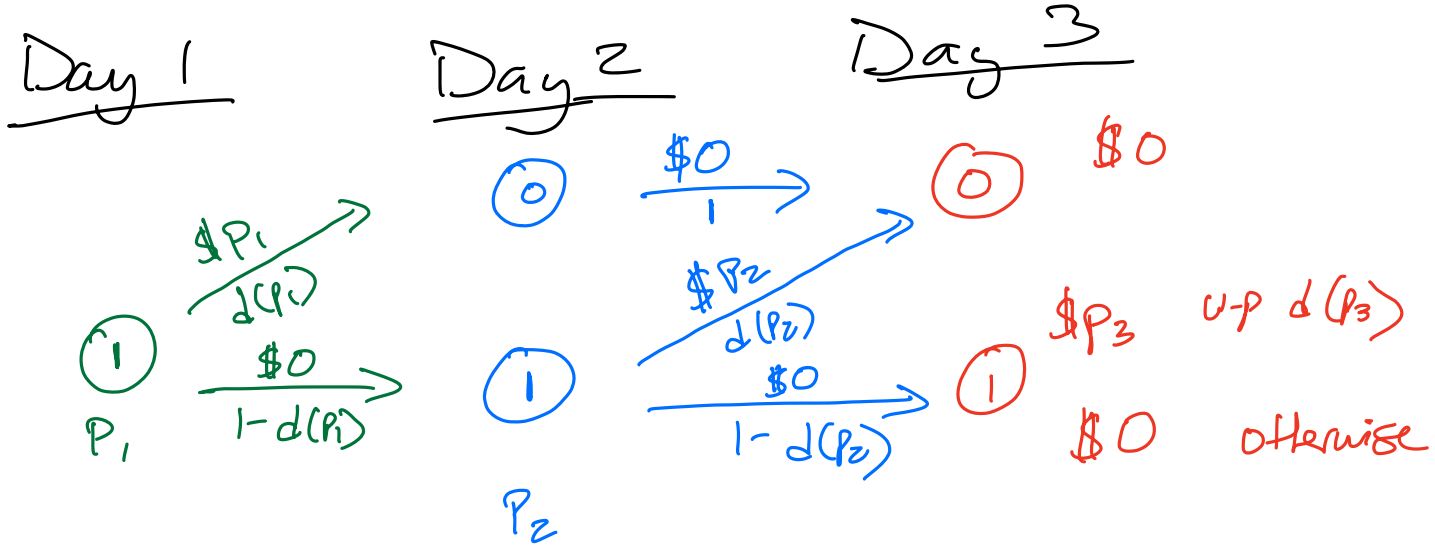

Expected revenue

$$\text{Revenue} = d(P_1)\left[P_1 + 0 + 0\right] + (1-d(P_1))\left[0 + d(P_2)\left[P_2 + 0\right] + (1-d(P_2))\left[0 + d(P_3)\left[P_3\right] \pm \cancel{(1-d(P_3))[0]}\right]\right]$$

let V_t^k be expected revenue if you have k cakes left on day t.

Backward induction

$$V_3^1 = d(P_3) \cdot P_3$$

$$V_2^1 = d(P_2)\,P_2 + (1-d(P_2))\,V_3^1$$

$$V_1^1 = d(P_1)(P_1) + (1-d(P_1))\,V_2^1$$