

Event	Formula	Probability
First bag ($P_X(0)$)	None	0.5
Second bag ($P_X(1)$)	None	0.5
Red ball from First bag ($P(Y = 0 \mid X = 0)$)	$\frac{4}{4+4}$	0.5
Red ball from Second bag ($P(Y = 0 \mid X = 1)$)	$\frac{2}{2+6}$	0.25
Red ball from either bag ($P_Y(0)$)	$0.5 \times 0.5 + 0.5 \times 0.25$	0.375