$$Cov(X,Y) = \mathbb{E}XY - \mathbb{E}X\,\mathbb{E}Y$$

$$\mathbb{E}X = \sum_{i,j} x_i y_j \, \mathbb{P}(X=x_i, Y=y_j) = 1\cdot 2 \cdot \tfrac{3}{10} + 1\cdot 5 \cdot \tfrac{2}{10} + 1\cdot 4 \cdot \tfrac{1}{10} + 2\cdot 3 \cdot \tfrac{2}{10} + 2\cdot 4 \cdot \tfrac{1}{10} + 3\cdot 4 \cdot \tfrac{1}{10} = \tfrac{48}{10} = 4.8$$

$$\mathbb{E}X\,\mathbb{E}Y = 1.5 \cdot 3 \implies Cov(X,Y) = 4.8 - 4.5 = 0.3$$

$$Cor(X,Y) = \frac{Cov(X,Y)}{\sqrt{DX}\,\sqrt{DY}} = \frac{0.3}{\sqrt{0.6}\,\sqrt{0.45}}$$

5) Разпр. на $X - 2Y \in \{-7, \ldots, -2\}$

X	1	2	3
	$\frac{6}{10}$	$\frac{3}{10}$	$\frac{1}{10}$

Y	2	3	4
	$\frac{3}{10}$	$\frac{4}{10}$	$\frac{3}{10}$

$$\mathbb{P}(X-2Y=-7) = \mathbb{P}(X=1, Y=4) = \tfrac{1}{10}$$
$$\mathbb{P}(X-2Y=-6) = \mathbb{P}(X=2, Y=4) = \tfrac{1}{10}$$
$$\mathbb{P}(X-2Y=-3) = \mathbb{P}(X=1, Y=2) + \mathbb{P}(X=3, Y=3) = \tfrac{3}{10}$$

Задач: 4 пъти хвърляме монета

$X = $ # ези от първите 3 хвърляния
$Y = $ # ези от последните две хвър.

$$\mathbb{E}S^{x_1+x_2+x_3} = \mathbb{E}S^{x_1}\,\mathbb{E}S^{x_2}\,\mathbb{E}S^{x_3}$$
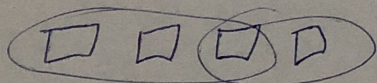
1) съвм. разпр.

X \ Y	0	1	2	3
0	$\frac{1}{16}$	$\frac{2}{16}$	$\frac{1}{16}$	0
1	$\frac{1}{16}$	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{1}{16}$
2	$\frac{0}{16}$	$\frac{2}{16}$	$\frac{2}{16}$	$\frac{1}{16}$

$$\mathbb{P}(X=0, Y=0) = \left(\tfrac{1}{2}\right)^4$$
$$\mathbb{P}(X=1, Y=0) = \binom{2}{1}\left(\tfrac{1}{2}\right)^2 \left(\tfrac{1}{2}\right)^2$$

при условие $Y=0$

2) $\mathbb{P}(X=0 \mid Y=0) = \tfrac{1}{4} = \dfrac{\frac{1}{16}}{\frac{1}{16}+\frac{2}{16}+\frac{3}{16}}$

$$\mathbb{P}(X=1 \mid Y=0) = \tfrac{2}{4}$$
$$\mathbb{P}(X=2 \mid Y=0) = \tfrac{1}{4}$$

при условие $Y=1$

~~$\mathbb{P}(X=k \mid Y=1) = \tfrac{1}{4}$~~ ~~$k=0,1,2$~~

$$\mathbb{P}(X=2 \mid Y=2) = \tfrac{1}{2} \quad \ldots$$