1)

S. 112/3

a)

x_i	1	2	3	4	5	6
$P(X=x_i)$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

$$E(X) = 1 \cdot \frac{1}{6} + \frac{2}{6} + \frac{3}{6} + \frac{4}{6} + \frac{5}{6} + \frac{6}{6} = \frac{21}{6} = \underline{\underline{3{,}5}} = \mu$$

$$V(X) = \sum (x_i - \mu)^2 \cdot P(X = x_i)$$
$$= (1-3{,}5)^2 \cdot \frac{1}{6} + (2-3{,}5)^2 \cdot \frac{1}{6} + \ldots + (6-3{,}5)^2 \cdot \frac{1}{6}$$
$$\approx 2{,}92 = \sigma^2 \quad \curvearrowright \quad \underline{\underline{\sigma \approx 1{,}71}}$$

mit CP: $\sum_{x=1}^{6} ((x-3.5)^2 \cdot 1/6)$

---

b)

x_i	2	3	4	5	6	7	8	9	10	11	12
$P(X=x_i)$	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$

$$E(X) = 2 \cdot \frac{1}{36} + 3 \cdot \frac{2}{36} + 4 \cdot \frac{3}{36} + \ldots + 12 \cdot \frac{1}{36} = \underline{\underline{7}} = \mu$$

$$V(X) = \sum (x_i - \mu)^2 \cdot P(X = x_i)$$
$$= (2-7)^2 \cdot \frac{1}{36} + (3-7)^2 \cdot \frac{2}{36} + (4-7)^2 \cdot \frac{3}{36} + \ldots + (12-7)^2 \cdot \frac{1}{36}$$
$$\approx 5{,}83 = \sigma^2 \quad \curvearrowright \quad \underline{\underline{\sigma \approx 2{,}42}}$$

S. 112/6

x_i	0	1	2	3
$P(X=x_i)$	0,0179 $\cdot 1$	0,0893 $\cdot 3$	0,1786 $\cdot 3$	0,1786 $\cdot 1$

X - Anzahl der roten Kugeln

3maliges Ziehen ohne Zurückl.

$$E(X) = 0 \cdot 0{,}0179 + 1 \cdot 3 \cdot 0{,}0893 + 2 \cdot 3 \cdot 0{,}1786 + 3 \cdot 1 \cdot 0{,}1786$$

$$\underline{\underline{E(X) = 1{,}8753}}$$

$$\underline{\underline{V(X) = 0{,}502}} = \sigma^2 \quad \curvearrowright \quad \underline{\underline{\sigma \approx 0{,}71}}$$

S. 112/8

x_i	1	2	3	4	....	$(n-1)$	n
$P(X=x_i)$	$\frac{1}{n}$	$\frac{1}{n}$	$\frac{1}{n}$	$\frac{1}{n}$	...	$\frac{1}{n}$	$\frac{1}{n}$

$$E(x) = (1+2+3+4+\ldots+(n-1)+n) \cdot \frac{1}{n}$$

$$E(x) = \sum_{i=1}^{n} i \cdot \frac{1}{n}$$

$$E(x) = \frac{n}{2}(n+1) \cdot \frac{1}{n}$$

$$\underline{\underline{E(x) = \frac{n+1}{2}}} = \mu$$

$$V(x) = \left(\left(1-\frac{n+1}{2}\right)^2 + \left(2-\frac{n+1}{2}\right)^2 + \ldots + \left(n-\frac{n+1}{2}\right)^2\right) \cdot \frac{1}{n}$$

CP: $\sum_{x=1}^{n}\left(\left(x-\frac{n+1}{2}\right)^2 \cdot \frac{1}{n}\right) = \underline{\underline{\frac{n^2-1}{12}}} = \sigma^2$