1.3

a

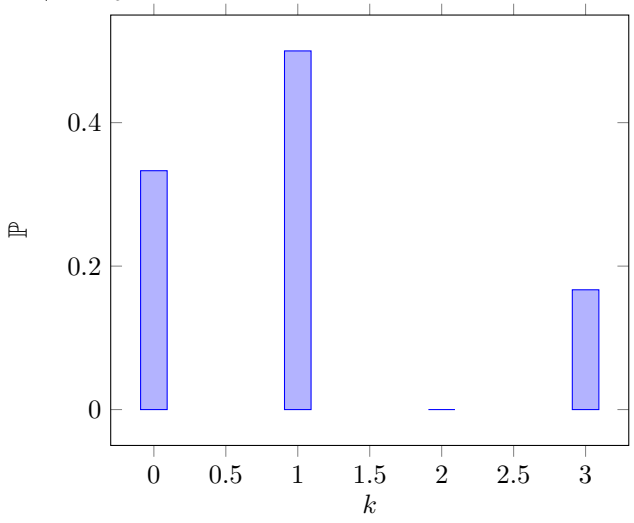
$\Omega = \{1, \dots, 20\}^2$
$\mathbb{P} : \Omega \to \mathbb{R}, (\omega_1, \omega_2) \mapsto \frac{1}{400}$

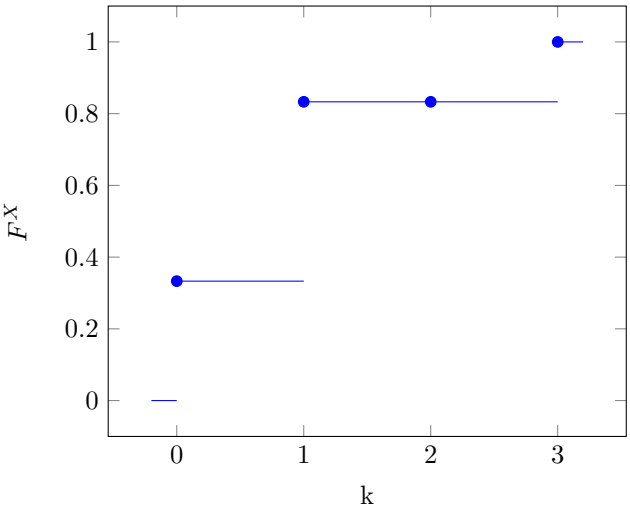
b

1. $A = \{6\} \times \{1 \dots, 20\}$
   $\mathbb{P}(A) = \frac{1}{20}$
2. $B = \{(6, 6)\}$
   $\mathbb{P}(B) = \frac{1}{400}$
3. $C = \{\{6\} \times \{1, \dots 20\}, \{1, \dots, 5, 7, \dots, 20\} \times \{6\}\}$
   $\mathbb{P}(C) = \frac{39}{400}$
4. $D = \{\{6\} \times \{1, \dots 5, 7, \dots 20\}, \{1, \dots, 5, 7, \dots, 20\} \times \{6\}\}$
   $\mathbb{P}(C) = \frac{38}{400}$
5. $E = \{\{1\} \times \{1, 2, 3\}, \{2\} \times \{1, 2\}, \{3\} \times \{1\}\}$
   $\mathbb{P}(E) = \frac{6}{400}$

1.4

k	$\mathbb{P}(X = k)$
0	$\frac{1}{3}$
1	$\frac{1}{2}$
2	0
3	$\frac{1}{6}$



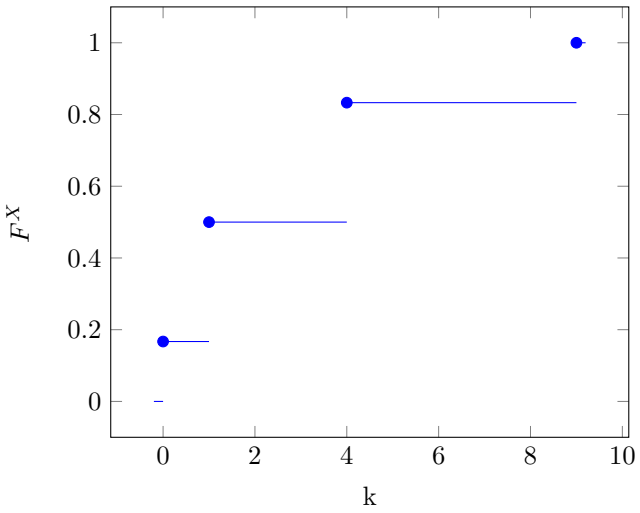


1.5

$\omega \in \Omega$	$X(\omega)$
1	4
2	1
3	0
4	1
5	4
6	9

$\omega \in X(\Omega)$	$X^{-1}(\omega)$	$\mathbb{P}(\omega)$
0	{3}	$\frac{1}{6}$
1	{2,4}	$\frac{2}{6}$
4	{1,5}	$\frac{2}{6}$
9	{6}	$\frac{1}{6}$

a



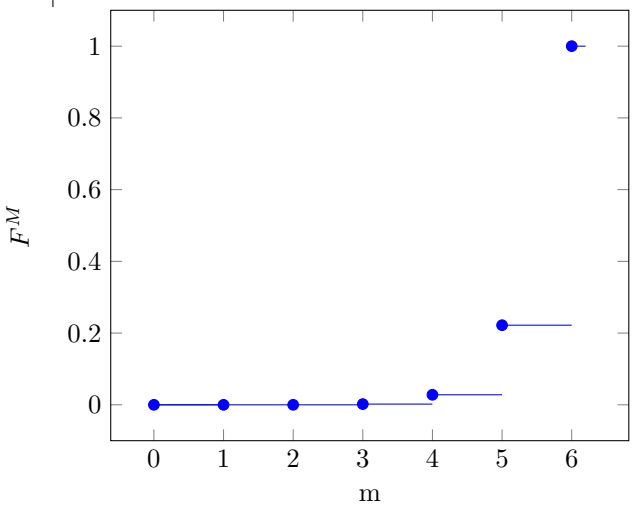
b

- $\mathbb{E} = 1 \cdot \frac{1}{3} + 4 \cdot \frac{1}{3} + 9 \cdot \frac{1}{6} = \frac{19}{6} \approx 3.17$
- $\mathbb{V} = (0 - \frac{19}{6})^2 \cdot \frac{1}{6} + (1 - \frac{19}{6})^2 \cdot \frac{1}{3} + (4 - \frac{19}{6})^2 \cdot \frac{1}{3} + (9 - \frac{19}{6})^2 \cdot \frac{1}{6} = \frac{329}{36} \approx 9.14$
- $\mathbb{P}(X \leq \mathbb{E}(X)) = \mathbb{P}(X = 0) + \mathbb{P}(X = 1) = \frac{1}{6} + \frac{1}{3} = \frac{1}{2}$

1.6

a

m	**Kombinationen**	$\mathbb{P}(M = m)$
1	$\{1\}^{10}$	$(\frac{1}{6})^{10} \approx 1.66 \cdot 10^{-8}$
2	$\{(2) \times \{1,2\}^9, (1) \times (2) \times \{1,2\}^8, \ldots, \{1,2\}^9 \times (2)\}$	$\frac{1}{6} \cdot (\frac{2}{6})^9 \cdot 6 \approx 5.08 \cdot 10^{-5}$
3	$\{(3) \times \{1,2,3\}^9, \{1,2\} \times (3) \times \{1,2,3\}^8, \ldots, \{1,2,3\}^9 \times (3)\}$	$\frac{1}{6} \cdot (\frac{3}{6})^9 \cdot 6 \approx 0.002$
4	$\vdots$	$\frac{1}{6} \cdot (\frac{4}{6})^9 \cdot 6 \approx 0.026$
5		$\frac{1}{6} \cdot (\frac{5}{6})^9 \cdot 6 \approx 0.194$
3		$1 - \sum_{m \in 0 \ldots 5} \mathbb{P}(M = m) \approx 0.778$



1.9

b

Z	**Anzahl**	**W-keit**
-5	1	0.000231743
-4	10	0.00386238
-3	45	0.0269079
-2	120	0.10128
-1	210	0.222616
0	252	0.290203
1	210	0.222616
2	120	0.10128
3	45	0.0269079
4	10	0.00386238
5	1	0.000231743