Lösungen zu Bernoulli

Nr. 2 a)-c) Nr. 3,

Nr. 2

X: Anzahl der 6er => $p = \frac{1}{6}$ $q = \frac{5}{6}$; 5 Würfe

a) $P_{\frac{1}{6}}^{5}(X = 2) = B\left(5; \frac{1}{6}; 2\right) = \binom{5}{2} \cdot \left(\frac{1}{6}\right)^{2} \cdot \left(\frac{5}{6}\right)^{5-2} = \frac{125}{3888} \approx 0{,}1608$

b) $P_{\frac{1}{6}}^{5}(X = 3) = B\left(5; \frac{1}{6}; 3\right) = \binom{5}{3} \cdot \left(\frac{1}{6}\right)^{3} \cdot \left(\frac{5}{6}\right)^{5-3} = \frac{125}{3888} \approx 0{,}0322$

c) $P_{\frac{1}{6}}^{5}(X = 5) = B\left(5; \frac{1}{6}; 5\right) = \binom{5}{5} \cdot \left(\frac{1}{6}\right)^{5} \cdot \left(\frac{5}{6}\right)^{0} = \frac{1}{7776} \approx 0{,}000129$

d) $P_{\frac{1}{6}}^{5}(X \geq 1) = 1 - P_{\frac{1}{6}}^{5}(X = 0) = 1 - \binom{5}{0} \cdot \left(\frac{1}{6}\right)^{0} \cdot \left(\frac{5}{6}\right)^{5} = \frac{4651}{7776} \approx 0{,}598$

e) $P_{\frac{1}{6}}^{5}(X \geq 3) = 1 - P_{\frac{1}{6}}^{5}(X \leq 2) = 1 - \left(P_{\frac{1}{6}}^{5}(X = 0) + P_{\frac{1}{6}}^{5}(X = 1) + P_{\frac{1}{6}}^{5}(X = 2)\right) =$

$$1 - \left(\binom{5}{0} \cdot \left(\frac{1}{6}\right)^{0} \cdot \left(\frac{5}{6}\right)^{5} + \binom{5}{1} \cdot \left(\frac{1}{6}\right)^{1} \cdot \left(\frac{5}{6}\right)^{4} + \binom{5}{2} \cdot \left(\frac{1}{6}\right)^{2} \cdot \left(\frac{5}{6}\right)^{3}\right) \approx 0{,}663$$

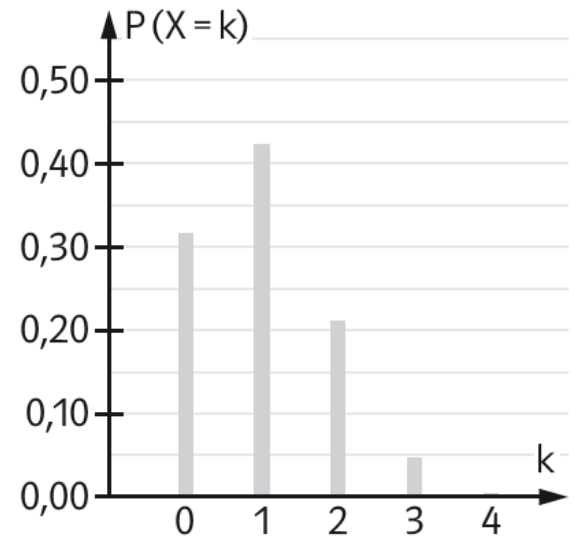
f) $P_{\frac{1}{6}}^{5}(X \leq 2) = P_{\frac{1}{6}}^{5}(X = 0) + P_{\frac{1}{6}}^{5}(X = 1) + P_{\frac{1}{6}}^{5}(X = 2) = \binom{5}{0} \cdot \left(\frac{1}{6}\right)^{0} \cdot \left(\frac{5}{6}\right)^{5} + \binom{5}{1} \cdot \left(\frac{1}{6}\right)^{1} \cdot \left(\frac{5}{6}\right)^{4} + \binom{5}{2} \cdot \left(\frac{1}{6}\right)^{2} \cdot \left(\frac{5}{6}\right)^{3} \approx 0{,}437$

Nr. 3 a) b):

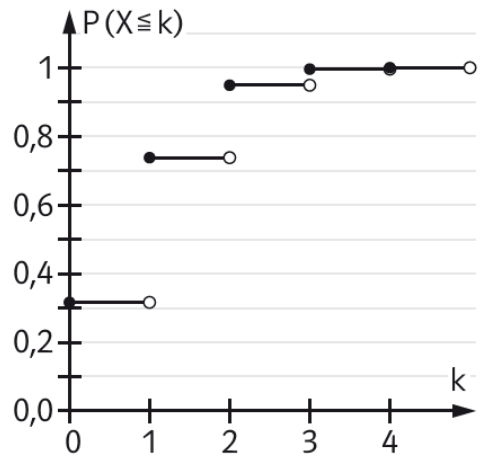
a) $n = 4, p = 0{,}25$

k	0	1	2	3	4
$P(X = k)$	$\frac{81}{256}$	$\frac{27}{64}$	$\frac{27}{128}$	$\frac{3}{64}$	$\frac{1}{256}$
$P(X \leq k)$	$\frac{81}{256}$	$\frac{189}{256}$	$\frac{243}{256}$	$\frac{255}{256}$	1

Stabdiagramm:



Kumulative Verteilungsfunktion:



b) $n = 6, p = 0{,}4$

k	0	1	2	3	4	5	6
$P(X = k)$	$\frac{729}{15625}$	$\frac{2916}{15625}$	$\frac{972}{3125}$	$\frac{864}{3125}$	$\frac{432}{3125}$	$\frac{576}{15625}$	$\frac{64}{15625}$
$P(X \leq k)$	$\frac{729}{15625}$	$\frac{729}{3125}$	$\frac{1701}{3125}$	$\frac{513}{625}$	$\frac{2997}{3125}$	0,995904	1