

S. 284 Nr. 4

a)

$$\begin{aligned}(1) \quad P(X = 3) &= \binom{6}{3} \cdot \left(\frac{1}{2}\right)^3 \cdot \left(\frac{1}{2}\right)^3 \\&= 20 \cdot \frac{1}{64} \\&= \frac{5}{16}\end{aligned}$$

$$\begin{aligned}(2) \quad P(X < 3) &= \left(\binom{6}{2} + \binom{6}{1} + \binom{6}{0}\right) \cdot \left(\frac{1}{2}\right)^6 \\&= (1 + 6 + 15) \cdot \frac{1}{64} \\&= 22 \cdot \frac{1}{64} \\&= \frac{11}{32}\end{aligned}$$

$$\begin{aligned}(3) \quad P(X > 3) &= \left(\binom{6}{4} + \binom{6}{5} + \binom{6}{6}\right) \cdot \left(\frac{1}{2}\right)^6 \\&= (1 + 6 + 15) \cdot \frac{1}{64} \\&= 22 \cdot \frac{1}{64} \\&= \frac{11}{32}\end{aligned}$$

b) Die Wahrscheinlichkeiten für (2) und (3) werden größer. Die Wahrscheinlichkeit für (1) wird kleiner.

S. 284 Nr. 5

a)

$$\begin{aligned}P(X = 4) &= \binom{8}{4} \cdot \left(\frac{1}{3}\right)^4 \cdot \left(\frac{2}{3}\right)^4 \\&= 17.07 \%\end{aligned}$$

b)

$$\begin{aligned}P(X \geq 4) &= \binom{8}{4} \cdot \left(\frac{1}{3}\right)^4 \cdot \left(\frac{2}{3}\right)^4 \\&+ \binom{8}{5} \cdot \left(\frac{1}{3}\right)^5 \cdot \left(\frac{2}{3}\right)^3 \\&+ \binom{8}{6} \cdot \left(\frac{1}{3}\right)^6 \cdot \left(\frac{2}{3}\right)^2 \\&+ \binom{8}{7} \cdot \left(\frac{1}{3}\right)^7 \cdot \left(\frac{2}{3}\right)^1 \\&+ \binom{8}{8} \cdot \left(\frac{1}{3}\right)^8 \cdot 1 \\&= 25.86 \%\end{aligned}$$

c)

$$\begin{aligned}P(X \leq 3) &= \binom{8}{3} \cdot \left(\frac{1}{3}\right)^3 \cdot \left(\frac{2}{3}\right)^5 \\&+ \binom{8}{2} \cdot \left(\frac{1}{3}\right)^2 \cdot \left(\frac{2}{3}\right)^6 \\&+ \binom{8}{1} \cdot \left(\frac{1}{3}\right)^1 \cdot \left(\frac{2}{3}\right)^7 \\&+ \binom{8}{0} \cdot \left(\frac{1}{3}\right)^0 \cdot \left(\frac{2}{3}\right)^8 \\&= 74.13 \%\end{aligned}$$

d)

$$\begin{aligned}P(X \geq 5) &= \binom{8}{5} \cdot \left(\frac{1}{3}\right)^5 \cdot \left(\frac{2}{3}\right)^3 \\&+ \binom{8}{6} \cdot \left(\frac{1}{3}\right)^6 \cdot \left(\frac{2}{3}\right)^2 \\&+ \binom{8}{7} \cdot \left(\frac{1}{3}\right)^7 \cdot \left(\frac{2}{3}\right)^1 \\&+ \binom{8}{8} \cdot \left(\frac{1}{3}\right)^8 \cdot 1 \\&= 8.79 \%\end{aligned}$$

a)

$$\begin{aligned}P(X = 2) &= \binom{20}{2} \cdot (0.98)^{18} \cdot (0.02)^2 \\&= 5.28 \%\end{aligned}$$

b)

$$P(X \geq 2) = 5.98 \%$$

c)

$$P(X \leq 2) = 99.29 \%$$

S. 284 Nr. 7

a)

$$P(X = 0) = 10.73 \%$$

b)

$$P(X = 3) = 20.13 \%$$

c)

$$P(X \geq 1) = 89.26 \%$$