Einführung in die Wahrscheinlichkeitstheorie

Übungsserie 7

Aufgabe 2:

$$\mathbb{P}(X=k)=\begin{cases}\frac{6}{36} & k=0\\ \frac{10}{36} & k=1\\ \frac{8}{36} & k=2\\ \frac{6}{36} & k=3\\ \frac{4}{36} & k=4\\ \frac{2}{36} & k=5\\ 0 & \text{sonst}\end{cases} \implies F(s)=\begin{cases}0 & X<0\\ \frac{6}{36} & 0\le s<1\\ \frac{16}{36} & 1\le s<2\\ \frac{24}{36} & 2\le s<3\\ \frac{30}{36} & 3\le s<4\\ \frac{34}{36} & 4\le s<5\\ 1 & 5\le s\end{cases}$$

Aufgabe 4:

(a)

$$\mathbb{P}(X=t)=\begin{cases}\frac{1}{3} & t=0\\ \frac{1}{9} & t=1\\ \frac{1}{3} & t=2\\ \frac{2}{9} & t=3\\ 0 & \text{sonst}\end{cases}$$

(b)

$$\mathbb{P}\{0.5<X\le 2\}=F(2)-F(0.5)=\frac{4}{9}$$

$$\mathbb{P}\{X<2\}=\mathbb{P}(\{X\le 2\}\setminus\{X=2\})=F(2)-\mathbb{P}(2)=\frac{4}{9}$$

$$\mathbb{P}\{X>1.5\}=1-F(1.5)=\frac{5}{9}$$

Aufgabe 5:

(a) $\mathbb{P}\{X=0\}=1-\mathbb{P}\{X>0\}=1-\sum_{k=1}^{\infty}\frac{1}{3^k}=1-\left(\frac{1}{1-\frac{1}{3}}-1\right)=\underline{\underline{\frac{1}{2}}}$

(b) $\mathbb{P}\{X\ge m\}=\sum_{k=m}^{\infty}\frac{1}{3^k}=\sum_{k=1}^{\infty}\frac{1}{3^k}-\sum_{k=1}^{m-1}\frac{1}{3^k}=\underline{\underline{\frac{1}{2}-\sum_{k=1}^{m-1}\frac{1}{3^k}}}$

(c) $\mathbb{P}\{X\in A\}=\sum_{k=1}^{\infty}\frac{1}{3^{2k}}=\sum_{k=1}^{\infty}\frac{1}{9^k}=\frac{1}{1-\frac{1}{9}}-1=\underline{\underline{\frac{1}{8}}}$