1st Ü2

(1) $P(X=x) = a(x+1)(6-x) \qquad x \in \{0, 1, \dots, 5\}$

$1 = \sum_{x=0}^{5} P(X=x) = a(6+10+12+12+10+6) = 56a \quad \Rightarrow a = \frac{1}{56}$

a) pmf?

$f(0) = \frac{6}{56} \quad f(1) = \frac{10}{56} \quad f(2) = \frac{12}{56} \quad f(3) = \frac{12}{56} \quad f(4) = \frac{10}{56} \quad f(5) = \frac{6}{56}$

b) $P(X \geq 4)$?

$P(X \geq 4) = P(X=4) + P(X=5) = \frac{10}{56} + \frac{6}{56} = \frac{16}{56} = 0{,}2857$

c) expectation $E(X)$, standard deviation $\sqrt{V(X)}$?

$E(X) = \sum_{x=0}^{5} P(X=x) \cdot x = \frac{6}{56} \cdot 0 + \frac{10}{56} \cdot 1 + \frac{12}{56} \cdot 2 + \frac{12}{56} \cdot 3 + \frac{10}{56} \cdot 4 + \frac{6}{56} \cdot 5$

$= \frac{1}{56}(10+24+36+40+30) = \frac{140}{56} = 2{,}5$

$\sqrt{V(X)} = \sqrt{E((X-E(X))^2)} = \sqrt{E(X^2) - (E(X))^2} = \sqrt{E(X^2) - 6{,}25}$

$E(X^2) = \sum_{x=0}^{5} P(X=x) \cdot x^2 = \frac{6}{56} \cdot 0 + \frac{10}{56} 1 + \frac{12}{56} \cdot 4 + \frac{12}{56} 9 + \frac{10}{56} 16 + \frac{6}{56} 25$

$= \frac{1}{56}(10+48+108+160+150) = \frac{476}{56} = 8{,}5$

$\sqrt{V(X)} = \sqrt{8{,}5 - 6{,}25} = \sqrt{2{,}25} = 1{,}5$