

Stad 2

Oppg 1

F: lyktene har lys foran

$$P(\text{Lys foran og bak}) = 0,31$$

B: lyktene har lys bak

$$P(\text{Lys kun foran}) = 0,24$$

$$P(\text{Lys kun bak}) = 0,07$$

$$\begin{aligned} a) \quad P(F) &= P(\text{Lys foran og bak}) + P(\text{Lys kun foran}) \\ &= 0,31 + 0,24 = 0,55 \end{aligned}$$

$$b) \quad P(B) = 0,38$$

$$c) \quad P(B|F) = \frac{P(B \cap F)}{P(F)} = \frac{0,31}{0,55}$$

Oppg 2

$$P(A) = 0,96$$

$$P(B) = 0,94$$

$$\begin{aligned} P(\text{Havarerer}) &= 1 - P(A) \cdot P(B) \\ &= 0,04 \cdot 0,06 \end{aligned}$$

Oppg 3)

C: Person i en befolkning smittet med Covid-19

$$P(T|C) = 0,96$$

T: Test står ut positivt for Covid-19

$$P(T'|C) = 0,04$$

$$P(C) = 0,03$$

a)
$$\underline{P(T|C')} = 1 - P(T|C)$$

b)
$$P(T) = P(T|C)P(C) + P(T|C')P(C')$$
$$= 0,96 \cdot 0,03 + 0,04 \cdot 0,97$$
$$= \underline{0,0325}$$

c)
$$P(C|T) = \frac{P(T|C)P(C)}{P(T)}$$
$$= \frac{0,96 \cdot 0,03}{0,0325}$$
$$= 0,902 \approx 90,2\%$$

d)
$$P(C'|T) = \frac{P(T'|C)P(C')}{P(T')} = \frac{(1 - P(T|C))P(C')}{1 - P(T)} = \frac{0,04 \cdot 0,97}{0,9675}$$

Opfrage 4)

X & Y = Anzahl Augen pro Wurf 1 & 2

$$Z = X + Y$$

a) $P(X \geq 5) = \frac{1}{3}$

b) $P(Z \geq 9) = \frac{g}{m} = \frac{10}{36}$

$$g = 10$$

$$m = 36$$

c) $P(Z \geq 9 \cap X \geq 5) = \frac{2}{36}$

d) $P(Z \geq 9 | X \geq 5) = \frac{P(Z \geq 9 \cap X \geq 5)}{P(X \geq 5)} = \frac{\frac{2}{36}}{\frac{1}{3}} = \frac{2}{36}$

e) $P(X \geq 5)$ unabhängig $P(Z \geq 9)$?

$$P(X \geq 5 | Z \geq 9) = P(X \geq 5)$$

$$\frac{P(X \geq 5 \cap Z \geq 9)}{P(Z \geq 9)} = \frac{1}{3}$$

$$\frac{\frac{2}{36}}{\frac{10}{36}} = \frac{1}{3}$$

$$\frac{2}{10} \neq \frac{1}{3}$$

	Y					
	1	2	3	4	5	6
X	1	2	3	4	5	6
	2	3	4	5	6	7
	3	4	5	6	7	8
	4	5	6	7	8	9
	5	6	7	8	9	10
	6	7	8	9	10	11
	7	8	9	10	11	12

Opptg 5)

a) $f(x) = 5x^4$

$$0 \leq x \leq 1$$

$$F(X \leq x) = \int_{-\infty}^x f(u) du = \underline{x^5}$$

b) $P(X > k) = \frac{1}{7} \quad k = ?$

$$P(X \leq k) = 1 - P(X > k)$$

$$k^5 = 1 - \frac{1}{7} = \frac{6}{7}$$

$$k = \sqrt[5]{\frac{6}{7}}$$

c) $P(\frac{1}{2} \leq X \leq 2) = \int_{\frac{1}{2}}^2 f(x) dx$

$$= \left[x^5 \right]_{\frac{1}{2}}^2 = 2^5 - \frac{1}{2^5} = 32 - \frac{1}{32} =$$

Opfrage 6)

$$f_{X,Y} = \frac{2(2y+x)}{3}$$

$$a) f_X(x) = \int_0^1 \frac{2(2y+x)}{3} dy = \int_0^1 \frac{4}{3}y + \frac{2}{3}x dy = \left[\frac{2}{3}y^2 + \frac{2}{3}xy \right]_0^1 = \frac{2}{3} + \frac{2}{3}x = \frac{2}{3}(x+1)$$

$$b) Y|X, X=x,$$

$$f_{Y|X}(y|x) = \frac{f_{X,Y}(x,y)}{f_X(x)} = \frac{\frac{2(2y+x)}{3}}{\frac{2}{3}(x+1)} = \frac{2y+x}{x+1}$$

