

HOOFDSTUK 6: Kansrekening

6.1 De productregel

Opgave 1:

- 3 van de 4 knikkers zijn rood
- $P(\text{rood uit II} = \frac{2}{3})$
- $4 \cdot 3 = 12$
- $\frac{6}{12} = 0,5$
- $\frac{3}{4} \cdot \frac{2}{3} = \frac{6}{12} = 0,5$

Opgave 2:

- $P(\text{twee wit}) = \frac{5}{10} \cdot \frac{2}{5} = \frac{10}{50} = 0,2$
- $P(1 \text{ blauw en } 1 \text{ rood}) = \frac{3}{10} \cdot \frac{2}{5} = \frac{6}{50} = 0,12$
- $P(1 \text{ wit en } 1 \text{ groen}) = \frac{5}{10} \cdot 1^5 = \frac{5}{50} = 0,1$
- $P(\text{geen blauw}) = \frac{7}{10} \cdot \frac{3}{5} = \frac{21}{50} = 0,42$
- $P(\text{geen rood}) = \frac{8}{10} \cdot \frac{5}{5} = \frac{40}{50} = 0,8$

Opgave 3:

- $P(3 \times \text{banaan}) = \frac{2}{4} \cdot \frac{1}{3} \cdot \frac{1}{2} = \frac{2}{24}$
- $P(\text{geen kersen}) = \frac{3}{4} \cdot \frac{2}{3} \cdot \frac{1}{2} = \frac{6}{24}$
- $P(2 \times \text{citroen en } 1 \times \text{banaan}) = \frac{1}{4} \cdot \frac{1}{3} \cdot \frac{1}{2} = \frac{1}{24}$
- $P(3 \times \text{citroen}) = 0$

Opgave 4:

- $\frac{4}{6} \cdot \frac{4}{6} \cdot \frac{4}{6} = \frac{64}{216}$
- $\frac{5}{6} \cdot \frac{5}{6} \cdot \frac{5}{6} = \frac{125}{216}$
- $\frac{2}{6} \cdot \frac{2}{6} \cdot \frac{2}{6} = \frac{8}{216}$

Opgave 5:

- $\frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4} = \frac{81}{256} = 0,316$
- $\frac{2}{4} \cdot \frac{2}{4} \cdot \frac{2}{4} \cdot \frac{2}{4} = \frac{16}{256} = 0,063$
- $P(4 \times \text{één}) = \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{256} = 0,004$

Opgave 6:

- empirische kans
- $0,6 \cdot 0,5 \cdot 0,8 = 0,24$
- $0,4 \cdot 0,2 \cdot 0,2 = 0,016$
- $P(\text{soep, vis, ijs}) = 0,6 \cdot 0,3 \cdot 0,8 = 0,144$
 $0,144 \cdot 500 = 72$

Opgave 7:

- afhankelijk
- $0,7 \cdot 0,2 = 0,14$

- c. afhankelijk
d. afhankelijk

Opgave 8:

- a. $\frac{2}{4} \cdot \frac{1}{3} = \frac{2}{12}$
b. $\frac{1}{4} \cdot \frac{1}{3} = \frac{1}{12}$
c. deze kansen optellen

Opgave 9:

- a. $\frac{2}{4} \cdot \frac{1}{3} = \frac{2}{12}$
b. $\frac{3}{4} \cdot \frac{2}{3} = \frac{6}{12}$
c. $\frac{2}{4} \cdot \frac{2}{3} + \frac{2}{4} \cdot \frac{1}{3} = \frac{6}{12}$
d. $P(22 \text{ of } 31) = \frac{1}{4} \cdot \frac{1}{3} + \frac{2}{4} \cdot \frac{1}{3} = \frac{3}{12}$
e. $P(\text{minstens } 1 \times \text{drie}) = 1 - P(\text{geen drie}) = 1 - \frac{2}{4} \cdot \frac{2}{3} = \frac{8}{12}$

Opgave 10:

- a. $\frac{2}{4} \cdot \frac{2}{3} \cdot \frac{3}{5} = \frac{12}{60} = 0,2$
b. $P(3 \times \text{banaan of } 3 \times \text{kers of } 3 \times \text{citroen}) = \frac{2}{4} \cdot \frac{1}{3} \cdot \frac{2}{5} + \frac{1}{4} \cdot \frac{1}{3} \cdot \frac{1}{5} + \frac{1}{4} \cdot \frac{1}{3} \cdot \frac{2}{5} = \frac{7}{60} = 0,117$
c. $\frac{1}{4} \cdot \frac{2}{3} \cdot \frac{3}{5} + \frac{3}{4} \cdot \frac{1}{3} \cdot \frac{3}{5} + \frac{3}{4} \cdot \frac{2}{3} \cdot \frac{2}{5} = \frac{27}{60} = 0,45$
d. $P(\text{minstens } 1 \text{ kers}) = 1 - P(\text{geen kers}) = 1 - \frac{3}{4} \cdot \frac{2}{3} \cdot \frac{4}{5} = \frac{36}{60} = 0,6$

Opgave 11:

- a. $\frac{2}{5} \cdot \frac{2}{6} \cdot \frac{3}{4} + \frac{2}{5} \cdot \frac{4}{6} \cdot \frac{1}{4} + \frac{3}{5} \cdot \frac{2}{6} \cdot \frac{1}{4} = \frac{26}{120} = 0,217$
b. $\frac{2}{5} \cdot \frac{2}{6} \cdot \frac{1}{4} = 0,033$
c. $P(\text{minstens } 1 \text{ wit}) = 1 - P(\text{geen wit}) = 1 - \frac{3}{5} \cdot \frac{4}{6} \cdot \frac{3}{4} = \frac{84}{120} = 0,7$
d. $\frac{3}{5} \cdot \frac{4}{6} \cdot \frac{3}{4} + \frac{2}{5} \cdot \frac{4}{6} \cdot \frac{3}{4} + \frac{3}{5} \cdot \frac{2}{6} \cdot \frac{3}{4} + \frac{3}{5} \cdot \frac{4}{6} \cdot \frac{1}{4} = \frac{90}{120} = 0,75$

Opgave 12:

- a. $\frac{3}{8} \cdot \frac{1}{8} \cdot \frac{2}{8} = \frac{6}{512} = 0,012$
b. $\frac{2}{8} \cdot \frac{6}{8} \cdot \frac{2}{8} + \frac{2}{8} \cdot \frac{1}{8} \cdot \frac{3}{8} + \frac{2}{8} \cdot \frac{6}{8} \cdot \frac{3}{8} = \frac{66}{512} = 0,129$
c. $\frac{7}{8} \cdot \frac{8}{8} \cdot \frac{7}{8} = \frac{392}{512} = 0,766$
d. $\frac{1}{8} \cdot \frac{8}{8} \cdot \frac{7}{8} + \frac{7}{8} \cdot \frac{8}{8} \cdot \frac{1}{8} = \frac{112}{512} = 0,219$
e. $P(\text{minstens } 1 \text{ peer}) = 1 - P(\text{geen peer}) = 1 - \frac{5}{8} \cdot \frac{7}{8} \cdot \frac{6}{8} = \frac{302}{512} = 0,590$

Opgave 13:

$$0,999 \cdot 0,997 \cdot 0,998 \cdot 0,992 \cdot 0,975 = 0,961$$

Opgave 14:

- a. $0,6 \cdot 0,3 \cdot 0,8 = 0,144$
b. $0,4 \cdot 0,3 \cdot 0,8 + 0,6 \cdot 0,7 \cdot 0,8 = 0,432$

Opgave 15:

- a. $0,40 \cdot 0,25 = 0,1$

b. $0,42 \cdot 0,60 \cdot 0,40 \cdot 0,75 = 0,076$

c. $P(\text{wordt niet 3 jaar}) = 1 - P(\text{wordt wel 3 jaar}) = 1 - 0,42 \cdot 0,60 \cdot 0,40 = 0,899$