3.2 Trekken met en zonder terugleggen

Opgave 17:

a. $\dfrac{\binom{7}{2}}{\binom{28}{2}} = 0{,}056$

b. nee, want bij a kies je twee verschillende leerlingen, maar bij de schijf kun je twee keer dezelfde sector draaien, dus deze kans is $0{,}25^2 = 0{,}0625$

Opgave 18:

a. $\dfrac{\binom{16}{2}\cdot\binom{24}{1}}{\binom{40}{3}} = 0{,}291$

b. $P(\text{minstens 1 blauwe}) = 1 - P(\text{ geen blauw}) = 1 - \dfrac{\binom{16}{3}}{\binom{40}{3}} = 0{,}943$

c. $\left(\dfrac{16}{40}\right)^3 \cdot \dfrac{24}{40} \cdot \binom{3}{2} = 0{,}288$

d. $P(\text{minstens 1 blauwe}) = 1 - P(\text{ geen blauw}) = 1 - \left(\dfrac{16}{40}\right)^3 = 0{,}936$

Opgave 19:

a. $\left(\dfrac{12}{22}\right)^4 = 0{,}089$

b. $\dfrac{\binom{12}{4}}{\binom{22}{4}} = 0{,}068$

Opgave 20:

a. $\dfrac{\binom{38}{3}}{\binom{60}{3}} = 0{,}247$

b. $\left(\dfrac{38}{60}\right)^3 = 0{,}254$

Opgave 21:

I en III

Opgave 22:

a. $P(2\text{ rood}) = \dfrac{p}{50} \cdot \dfrac{p-1}{49} = \dfrac{p^2 - p}{2450}$

b. $P(1\text{ rood en 1 wit}) = 2 \cdot \dfrac{p}{50} \cdot \dfrac{50-p}{49} = \dfrac{p(50-p)}{25 \cdot 49} = \dfrac{50p - p^2}{1225}$

c. $\dfrac{50p - p^2}{1225} > 0{,}5$

$y_1 = \dfrac{50x - x^2}{1225}$ met table: $p = 22$, 23 , 24 , 25 , 26 , 27 of 28

Opgave 23:

10 rode en $a - 10$ blauwe knikkers

a. $P(2 \text{ rood}) = \dfrac{10}{a} \cdot \dfrac{9}{a-1} = \dfrac{90}{a^2 - a}$

b. $P(1 \text{ rood en } 1 \text{ blauw}) = 2 \cdot \dfrac{10}{a} \cdot \dfrac{a-10}{a-1} = \dfrac{20(a-10)}{a(a-1)} = \dfrac{20a - 200}{a^2 - a}$

c. $\dfrac{20a - 200}{a^2 - a} = \dfrac{10}{21}$

$y_1 = \dfrac{20x - 200}{x^2 - x}$ en $y_2 = \dfrac{10}{21}$ intersect geeft $x = 15 \quad \vee \quad x = 28$

Opgave 24:

15 rode en $n - 15$ witte knikkers

a. $P(2 \text{ rood}) = \dfrac{15}{n} \cdot \dfrac{14}{n-1} = \dfrac{210}{n^2 - n} < 0{,}1$

$y_1 = \dfrac{210}{x(x-1)}$ met table: $n \geq 47$

b. $P(1 \text{ rood en } 1 \text{ wit}) = 2 \cdot \dfrac{15}{n} \cdot \dfrac{n-15}{n-1} = \dfrac{30(n-15)}{n(n-1)}$

$y_1 = \dfrac{30(x-15)}{x(x-1)}$ met de optie maximum geeft $x = 29 \quad \vee \quad x = 30$

Opgave 25:

a. $\dfrac{\binom{3}{2} \cdot \binom{7}{3}}{\binom{10}{5}} = 0{,}417$

b. $\dfrac{\binom{30}{2} \cdot \binom{70}{3}}{\binom{100}{5}} = 0{,}316$

c. $\dfrac{\binom{300}{2} \cdot \binom{700}{3}}{\binom{1000}{5}} = 0{,}309$

d. $\dfrac{\binom{3000}{2} \cdot \binom{7000}{3}}{\binom{10000}{5}} = 0{,}309$

e. alle kansen zijn gelijk, want $P(\text{rood}) = 0{,}3$ en $P(\text{wit}) = 0{,}7$

$0{,}3^2 \cdot 0{,}7^3 \cdot \binom{5}{2} = 0{,}3087$

Opgave 26:

a. $0{,}7^{15} = 0{,}0047$

b. $0{,}3^2 \cdot 0{,}7^{13} \cdot \binom{15}{2} = 0{,}0916$

c. $P(\text{minstens } 2) = 1 - P(0 \text{ of } 1) = 1 - (0{,}7^{15} + \binom{15}{1} \cdot 0{,}7^{14} \cdot 0{,}3) = 0{,}9647$

Opgave 27:

a. $0{,}85^{10} = 0{,}1969$

b. $0{,}6^8 \cdot 0{,}15^2 \cdot \binom{10}{8} = 0{,}0170$

c. $0{,}6^9 \cdot 0{,}4 \cdot \binom{10}{9} + 0{,}6^{10} = 0{,}0464$

Opgave 28:

a. $2 \cdot 0{,}18 \cdot 0{,}82 = 0{,}2952$

b. $0{,}82^5 + 0{,}82^4 \cdot 0{,}18 \cdot \binom{5}{1} = 0{,}7776$

c. $P(\text{minstens 1 linkshandige}) = 1 - P(\text{ allemaal rechtshandig}) = 1 - 0{,}82^n > 0{,}99$

$-0{,}82^n > -0{,}01$

$0{,}82^n < 0{,}01$

$n > \dfrac{\log 0{,}01}{\log 0{,}82} = 23{,}2$

dus minstens 24 personen

d. $\dfrac{\binom{9}{2}}{\binom{50}{2}} = 0{,}0294$

Opgave 29:

a. $0{,}94^{12} = 0{,}476$

b. $0{,}09^2 \cdot 0{,}91^{10} \cdot \binom{12}{2} = 0{,}208$

c. $0{,}06^2 \cdot 0{,}85^{10} \cdot \binom{12}{2} = 0{,}047$

Opgave 30:

a. $0{,}88^{11} = 0{,}245$

b. $0{,}88^{22} + 0{,}88^{21} \cdot 0{,}12 \cdot \binom{22}{1} + 0{,}88^{20} \cdot 0{,}12^2 \cdot \binom{22}{2} = 0{,}498$

c. $\dfrac{\binom{5}{2} \cdot \binom{30}{4}}{\binom{35}{6}} = 0{,}169$

Opgave 31:

a. $P(\text{minstens 2 lopend}) = 1 - P(\text{ 0 of 1 lopend}) = 1 - 0{,}95^{18} - 0{,}95^{17} \cdot 0{,}05 \cdot \binom{18}{1} = 0{,}226$

b. $0{,}25^{4} \cdot 0{,}75^{14} \cdot \binom{18}{4} + 0{,}25^{5} \cdot 0{,}75^{13} \cdot \binom{18}{5} = 0{,}412$

c. $0{,}6^{12} \cdot 0{,}25^{6} \cdot \binom{18}{12} = 0{,}010$

d. $0{,}3^{4} \cdot 0{,}7^{14} \cdot \binom{18}{4} = 0{,}168$

e. $40\% = 7{,}2$ en $60\% = 10{,}8$

$$P(\text{8, 9 of 10 met de auto}) = 0{,}6^{8} \cdot 0{,}4^{10} \cdot \binom{18}{8} + 0{,}6^{9} \cdot 0{,}4^{9} \cdot \binom{18}{9} + 0{,}6^{10} \cdot 0{,}4^{8} \cdot \binom{18}{10}$$
$$= 0{,}379$$