$P(R) = \frac{1}{3}$

1a) $P^{15}_{\frac{2}{3}}(Z \geq 8) = 1 - P^{15}_{\frac{2}{3}}(Z \leq 7)$

TW $1 - 0{,}08823 = 91{,}2\%$

b) $R(\overline{R}R)(\overline{R}R) \ldots \quad \overline{R}(R\overline{R})(R\overline{R}) \ldots$

n ungerade $\Rightarrow$ $\frac{n-1}{2}$ $\quad \frac{n-1}{2}$

n-1 Paare

$\frac{1}{3} \cdot \left(\frac{2}{3} \cdot \frac{1}{3}\right)\left(\frac{2}{3} \cdot \frac{1}{3}\right) \ldots + \frac{2}{3}\left(\frac{1}{3} \cdot \frac{2}{3}\right)\left(\frac{1}{3} \cdot \frac{2}{3}\right) \ldots$

$P_n = \frac{1}{3} \cdot \left(\frac{2}{3} \cdot \frac{1}{3}\right)^{\frac{n-1}{2}} + \frac{2}{3}\left(\frac{2}{3} \cdot \frac{1}{3}\right)^{\frac{n-1}{2}}$

$\underbrace{\left(\frac{1}{3} + \frac{2}{3}\right)}_{1} \left(\frac{2}{9}\right)^{\frac{n-1}{2}} = \left(\frac{2}{9}\right)^{\frac{1}{2}(n-1)}$

$= \left(\frac{\sqrt{2}}{3}\right)^{n-1}$

c) $\left(\frac{\sqrt{2}}{3}\right)^{n-1} < 10^{-9} \quad | \ln$

$(n-1)\ln\left(\frac{\sqrt{2}}{3}\right) < \ln 10^{-9} \quad | : \ln\left(\frac{\sqrt{2}}{3}\right) < 0$

$n - 1 > \frac{\ln 10^{-9}}{\ln\left(\frac{\sqrt{2}}{3}\right)}$

$n > 1 + 27{,}6$

$n > 28{,}6$

$n \geq 29$

2.) $p_1 = 0{,}18 \quad p_0 \geq 0{,}20$

0 $\quad k = 54 \quad k+1 = 95 \quad n = 500$ Raucher

19% v. $500 =$

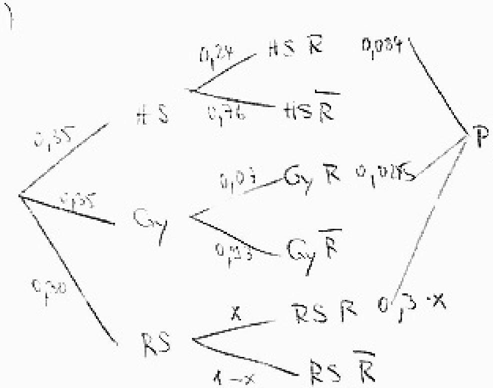
$0{,}19 \cdot 500 = 95$

$P^{500}_{0{,}18}(Z \geq 95) = 1 - P^{500}_{0{,}18}(Z \leq 94)$

$= 1 - \Phi\left(\frac{94{,}5 - 500 \cdot 0{,}18}{\sqrt{500 \cdot 0{,}18 \cdot 0{,}82}}\right) = 1 - \Phi(0{,}52)$

$= 1 - 0{,}69847 = 30{,}2\%$

3)



$P(R) = 0{,}16 = 0{,}084 + 0{,}0245 + 0{,}3x$

$x = 0{,}172 = P_{RS}(R)$

a) $P_{RS}(R) = 17{,}2\%$

$P_R(Gy) = \frac{P(Gy \cap R)}{P(R)}$

$= \frac{0{,}0245}{0{,}16} = 15{,}3\%$

b) $P^2_{0{,}24}(Z \geq 1) = 1 - P^2_{0{,}24}(Z = 0) = 1 - 0{,}76^2$

2xHS $\quad 0{,}35^2 \cdot (1 - 0{,}76^2)$

2xGy $\quad + 0{,}35^2 \cdot (1 - 0{,}93^2)$

2xRS $\quad + 0{,}30^2 \cdot (1 - 0{,}\cancel{172}828^2) = 9{,}6\%$

3c) $n = 800$, $p = 0{,}07$ $\Big\}$ $\mu = 800 \cdot 0{,}07 = 56$

$\sigma^2 = 800 \cdot 0{,}07 \cdot 0{,}93 = 52{,}08$

$P(|X - 56| \leq a) \geq 1 - \frac{52{,}08}{a^2} \geq 0{,}90$

$0{,}10 \geq \frac{52{,}08}{a^2} \quad | \cdot a^2 \quad | : 0{,}10$

$a^2 \geq \frac{52{,}08}{0{,}10} \quad | \sqrt{\ }$

$a \geq 22{,}83 \Rightarrow a \geq 23$

gesuchtes Intervall: $X \in [33; 79]$

4a) $38 < \begin{matrix} 12\,R \\ 26\,\overline{R} \end{matrix} \qquad 38 < \begin{matrix} 18 \\ 20 \end{matrix}$

$P(A) = \frac{\binom{12}{6}\binom{26}{12}}{\binom{38}{18}} \cdot \underbrace{\frac{\binom{6}{6}\binom{14}{14}}{\binom{20}{20}}}_{1} = 26{,}6\%$

b) $n = 4$ Kurse

$k = 20$ mal Ziehen

ohne Rf / mit Zl

$\binom{n+k-1}{k} = \binom{4+20-1}{20} = \binom{23}{20} = 1771$