$$\frac{\text{Anzahl der „richtigen" Mögl.}}{\text{Anzahl aller Mögl.}}$$

$$\frac{\dots}{\binom{52}{5}}$$

$$\frac{4}{\binom{52}{5}} \approx 0.0001539\%$$

$$A\ 2\ 3\ 4\ \boxed{5\ 6\ 7\ 8\ 9\ 10\ J\ D\ K}$$

$$\frac{9\cdot 4}{\binom{52}{5}} \approx 0{,}00139\%$$

$$\frac{\binom{13}{2}\cdot\binom{2}{1}\cdot\binom{4}{4}\cdot\binom{4}{1}}{\binom{52}{5}} = 0.024\%$$

$$\frac{\binom{13}{2}\binom{2}{1}\cdot\binom{4}{3}\cdot\binom{4}{2}}{\binom{52}{5}}$$

$$\frac{\left(\binom{13}{5}-10\right)\cdot\binom{4}{1}}{\binom{52}{5}} \approx 0{,}19654\%$$

A 2 3 4 $\boxed{5\ 6\ 7\ 8\ 9\ 10\ J\ D\ K\ A}$

$$\frac{10\cdot 4^{5}-36-4}{\binom{52}{5}} = 0{,}3924\%$$

$$\frac{\binom{13}{3}\cdot\binom{3}{1}\cdot\binom{4}{3}\cdot\binom{4}{1}\cdot\binom{4}{1}}{\binom{52}{5}} \approx 2{,}11\%$$

$$\frac{\binom{13}{3}\cdot\binom{3}{1}\cdot\binom{4}{2}^{2}\cdot\binom{4}{1}}{\binom{52}{5}} \approx 4{,}75\%$$

$$\frac{\binom{13}{4}\cdot\binom{4}{1}\cdot\binom{4}{2}\cdot\binom{4}{1}^3}{\binom{52}{5}} \approx 42{,}26\,\%$$

10.1b) $$\frac{\binom{47}{2}\cdot 4}{\binom{52}{7}} \approx 0{,}00232\,\%$$

10.2 (a) (i) $$|M| = \left|\bigcup_{k=1}^{n} \{(x,y,z) \in [k]^2 \times \{k+1\}\}\right| =$$

$$\sum_{k=1}^{n} k^2$$

$x = y$

$x < y$

$y < x$

$$M = \overbrace{\{(x,y,z) \in [n+1]^3 \mid x < y < z\}}^{XY} \cup \overbrace{\{(x,y,z) \in [n+1]^3 \mid y < x < z\}}^{YX} \cup \underbrace{\{(x,y,z) \in [n+1]^3 \mid x = y < z\}}$$

$$|M| = |XY| + |YX| + |Z|$$

$$= \binom{n+1}{3} + \binom{n+1}{3} + \binom{n+1}{2} = 2\binom{n+1}{3} + \binom{n+1}{2}$$

$$\sum_{n=1}^{k} k^2 = 2\binom{n+1}{3} + \binom{n+1}{2}$$

$$= 2\frac{(n+1)!}{3! \cdot (n-2)!} + \frac{(n+1)!}{2!(n-1)!} = 2 \cdot \frac{(n+1)(n)(n-1)}{6}$$

$$+ \frac{(n+1)(n)}{2} = \frac{(n^2+n)(n-1)}{3} + \frac{n^2+n}{2} =$$

$$\frac{n^3 - n^2 + n^2 - n}{3} + \frac{n^2 + n}{2} = \frac{n^3}{3} + \frac{n^2}{2} + \frac{n}{6}$$

b) $\sum_{n=1}^{d} k^d =$

3-D: $x_1 = x_2 = x_3 < 2$, $x_1 = x_2 < x_3 < 2$,

$x_1 = x_3 < x_2 < 2$, ...

Wenn mehrere x_i den gleichen Wert annehmen, muss man nur noch $i < d$ Elemente auswählen,

$\binom{n+1}{i}$

$d! \binom{n+1}{d+1}$

$$\sum_{n+1}^{d} k^d = d! \binom{n+1}{d+1}$$