I. $p = 0.01 \quad (0 < p < 1), \rightarrow$ defektes Teil

$n = 1'000$ Teile

$$\binom{n}{k} p^k \cdot (1 - p^{n-k})$$

$=10$ a) 10 Teile defekt, $k = 10$

$$\binom{1000}{10} 0.01^{10} \cdot ((1-0.01)^{990}) = 12.57\,\%$$

nCr verwendet

<10 b) $$\sum_{k=0}^{9} \binom{1000}{k} 0.01^k ((1-0.01)^{(1000-k)} =$$

$$\sum_{k=0}^{9} \frac{1000! \cdot 0.01^k (1-0.01)^{1000-k}}{k!\,(1000-k)!} = 45.73\,\%$$

>20 c) $$1 - \sum_{k=0}^{20} ((\binom{1000}{k} 0.01^k (1-0.01)^{1000-k} = 0.15\,\%$$

nCr verwendet

II $\varnothing$ 3F / Seite

a) $p(0)$, $\mu = 3$

$$\frac{3^0}{0!}e^{-3} = 0.0497 = 4.97\%$$

b)

$$\frac{3^1}{1!}e^{-3} = 0.1493 = 14.93\%$$

c)

$$\frac{3^0}{0!}e^{-3} + \frac{3^1}{1!}e^{-3} + \frac{3^2}{2!}e^{-3} = 0.4231 = 42.31\%$$

$1 - 42.31 =$

d)

$$1 - \frac{3^0}{0!}e^{-3} - \frac{3^1}{1!}e^{-3} - \frac{3^2}{2!}e^{-3} = 0.5768 = 57.68\%$$

III. $\underbrace{3W \quad 2B}_{5 \text{ kugeln}}$

$3\times$ 
ziehen & zurücklegen

$E = ?$
$V = ?$

$p(B) = \frac{2}{5}$

$0\,B: \binom{3}{0} \frac{2}{5}^{0} \left(1 - \frac{2}{5}\right)^3 = 21.6\%$ $\quad \frac{27}{125}$

$1\,B: \binom{3}{1} \frac{2}{5}^{1} \left(1 - \frac{2}{5}\right)^2 = 43.2\%$ $\quad \frac{54}{125}$

$2\,B: \binom{3}{2} \frac{2}{5}^{2} \left(1 - \frac{2}{5}\right)^1 = 28.8\%$ $\quad \frac{36}{125}$

$3\,B: \binom{3}{3} \frac{2}{5}^{3} \left(1 - \frac{2}{5}\right)^0 = 6.4\%$ $\quad \frac{8}{125}$

Wahrsch.-verteilung
für x B:

r	0	1	2	3
$P(X=r)$	$\frac{27}{125}$	$\frac{54}{125}$	$\frac{36}{125}$	$\frac{8}{125}$

$$E(X) = 0 \cdot \frac{27}{125} + 1 \cdot \frac{54}{125} + 2 \cdot \frac{36}{125} + 3 \cdot \frac{8}{125} = \underline{\underline{1.2}}$$

$$V(X) = (0-1.2)^2 \cdot \frac{27}{125} + (1-1.2)^2 \cdot \frac{54}{125} + (2-1.2)^2 \cdot \frac{36}{125} + (3-1.2)^2 \frac{8}{125}$$

$$= \underline{\underline{0.72}}$$

IV. X wie oft K
Y wie oft Z

8 Möglichkeiten

$X \backslash Y$	0	1	2	3	$X=r$
0	0	0	0	$\frac{1}{8}$	$\frac{1}{8}$
1	0	0	$\frac{3}{8}$	0	$\frac{3}{8}$
2	0	$\frac{3}{8}$	0	0	$\frac{3}{8}$
3	$\frac{1}{8}$	0	0	0	$\frac{1}{8}$
$Y=r$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$	

$X(0), Y(3) \rightarrow \frac{1}{8} \neq \frac{1}{8} \cdot \frac{1}{8}$

V. 2 Würfel

Augensumme 7

$E(X) = ?$

$$P(X) = \left(1 - \frac{1}{6}\right)^{k-1} \cdot \frac{1}{6} = \left(\frac{5}{6}\right)^{k-1} \frac{1}{6}$$

$$E(X) = \sum_{k=0}^{\infty} k \left(\frac{5}{6}\right)^{k-1} \frac{1}{6} = \underline{\underline{6}}$$

<u>6 Würfe</u>