

Binomialverteilte Zufallszahlen

Dokument: DX1162

1 Aufgabengenerator

(%i43) load(distrib)\$

(%i44) n:10;p:1/6;

(%o44) 10

(%o45) $\frac{1}{6}$

(%i46) versuche:1000 /* diese Anzahl sollte man variieren: 100,1000,10000,...
die Ausführungsdauer steigt allerdings */;

(%o46) 1000

(%i47) anzahl_6:random_binomial(n,p,versuche)\$

(%i48) load(descriptive)\$

(%i49) gruppierung:discrete_freq(anzahl_6);

(%o49) [[0,1,2,3,4,5,6],[169,327,302,144,40,17,1]]

(%i50) X:gruppierung[1];

(%o50) [0,1,2,3,4,5,6]

(%i51) H:gruppierung[2];

(%o51) [169,327,302,144,40,17,1]

2 Erzeugte Verteilung

(%i52) Verteilung: matrix(
["Anzahl der 6-er", "Häufigkeit"],
[transpose(X), transpose(H)]
);

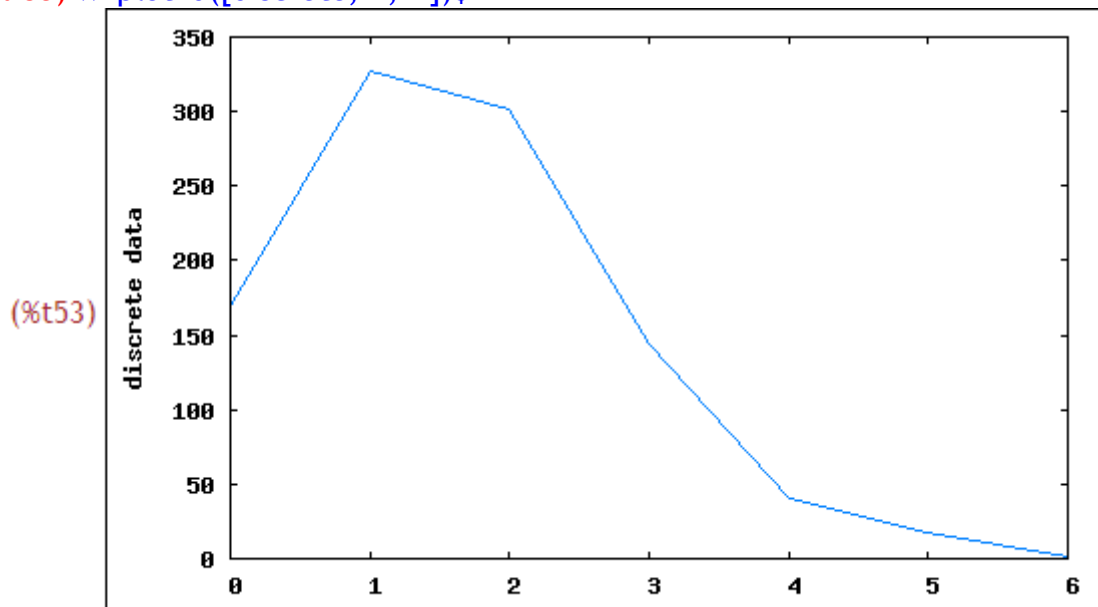
(%o52)

Anzahl der 6-er	Häufigkeit
0	169
1	327
2	302
3	144
4	40
5	17
6	1

3 Darstellungen

3.1 Häufigkeitsverteilung

(%i53) wxplot2d([discrete, X, H])\$

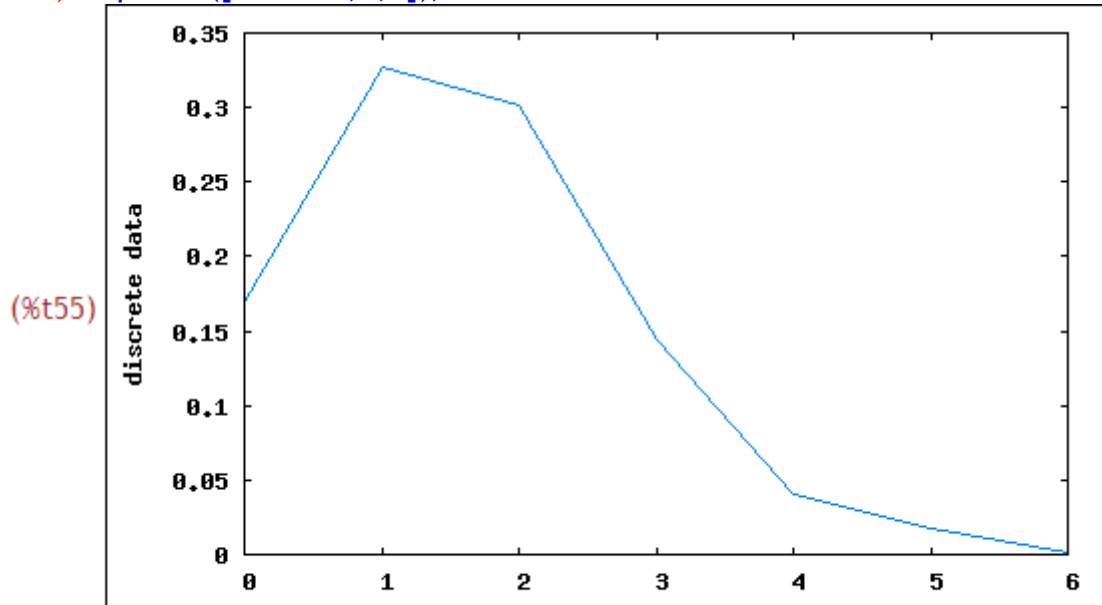


3.2 Wahrscheinlichkeitsverteilung

(%i54) P:H/1000;

(%o54) [$\frac{169}{1000}, \frac{327}{1000}, \frac{151}{500}, \frac{18}{125}, \frac{1}{25}, \frac{17}{1000}, \frac{1}{1000}$]

(%i55) wxplot2d([discrete,X,P]);



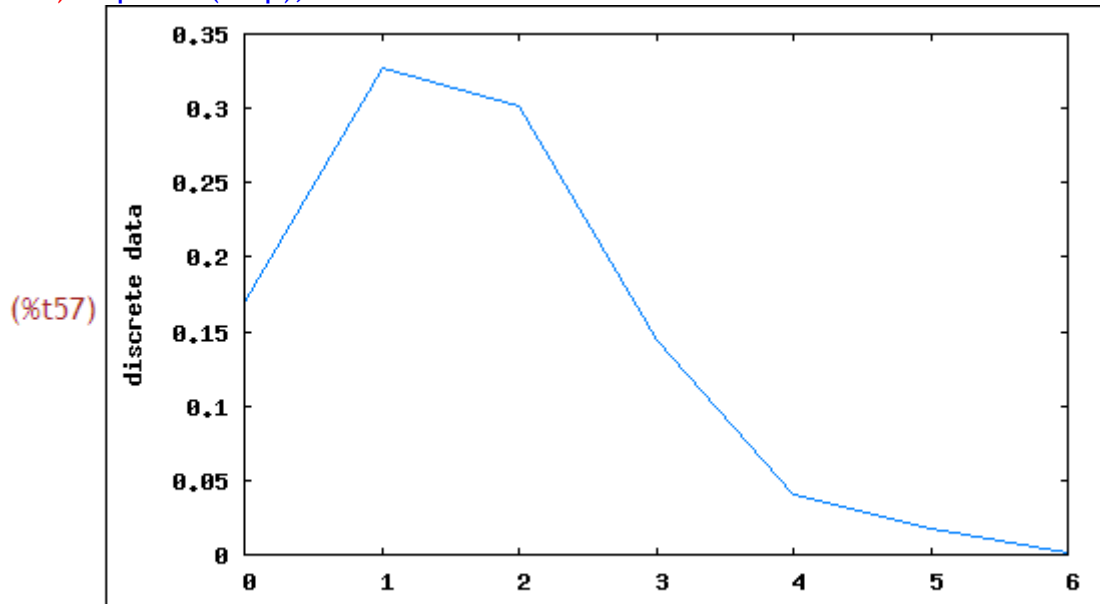
(%o55)

Simulation zur Binomialverteilung

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(%i56) emp:[discrete,X,P];
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(%o56) [discrete,[0,1,2,3,4,5,6],[ $\frac{169}{1000}$ , $\frac{327}{1000}$ , $\frac{151}{500}$ , $\frac{18}{125}$ , $\frac{1}{25}$ , $\frac{17}{1000}$ ,  
 $\frac{1}{1000}$ ]]
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(%i57) wxplot2d(emp);
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(%o57)

3.3 Vergleich mit den theoretischen Werten

(%i58) W(k):=binomial(n,k)*p**k*(1-p)**(n-k);

(%o58) $W(k) := \binom{n}{k} p^k (1-p)^{n-k}$

(%i59) B:=makelist(W(k),k,0,n);

(%o59) $\left[\frac{9765625}{60466176}, \frac{9765625}{30233088}, \frac{1953125}{6718464}, \frac{390625}{2519424}, \frac{546875}{10077696}, \frac{21875}{1679616}, \frac{21875}{10077696}, \frac{625}{2519424}, \frac{125}{6718464}, \frac{25}{30233088}, \frac{1}{60466176} \right]$

(%i60) k:=makelist(i,i,0,n);

(%o60) $[0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]$

(%i61) liste:[discrete,k,B];

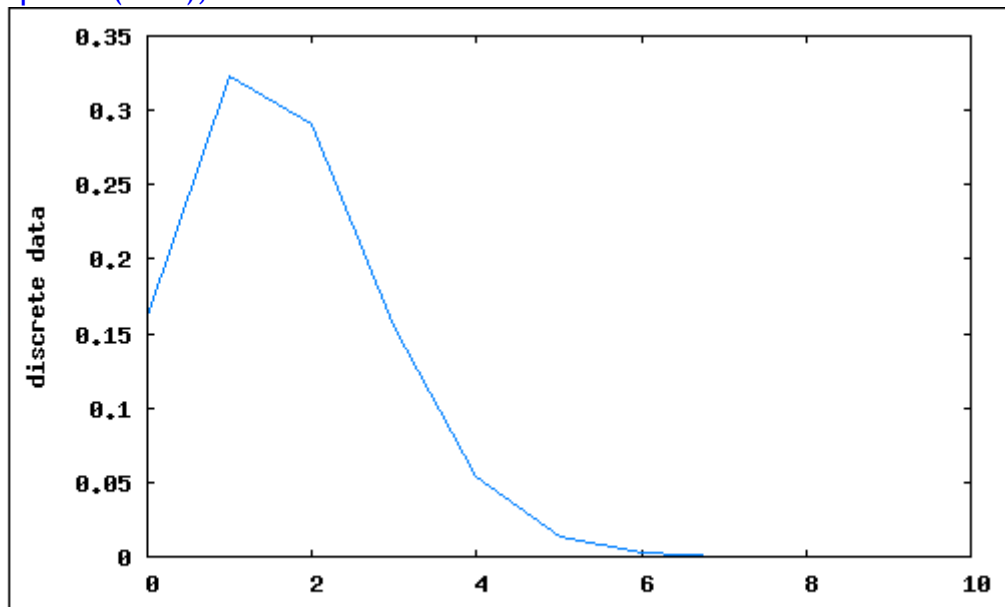
(%o61) $[discrete, [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10], \left[\frac{9765625}{60466176}, \frac{9765625}{30233088}, \frac{1953125}{6718464}, \frac{390625}{2519424}, \frac{546875}{10077696}, \frac{21875}{1679616}, \frac{21875}{10077696}, \frac{625}{2519424}, \frac{125}{6718464}, \frac{25}{30233088}, \frac{1}{60466176} \right]]$

Simulation zur Binomialverteilung

Theoretische Werte

(%i62) wxplot2d(liste);

(%t62)

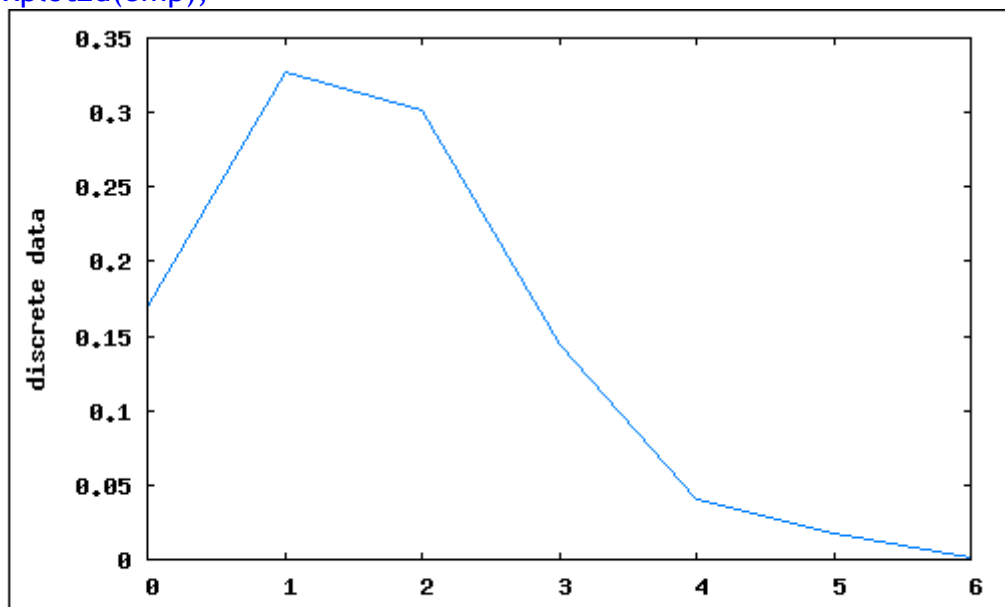


(%o62)

Experimentelle Werte

(%i63) wxplot2d(emp);

(%t63)



(%o63)

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