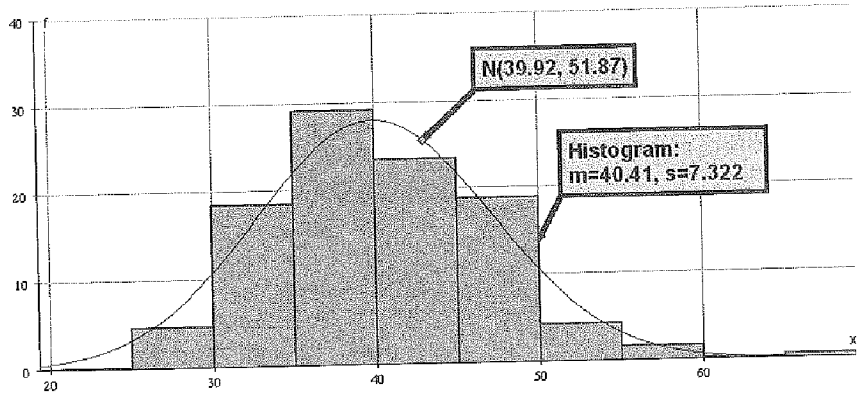
Example: Fitting a probability distribution to a data set.

Autograph will find the best parameters to fit a **binomial, poisson** or **normal** distribution to a data set.

First draw a histogram, then a normal distribution (any parameters), then chose 'fit to data'. The probability distribution will only appear to be a good fit if the frequency density scale (unit = 1) is used – this way the total area on both diagrams = 1.



Appendix

CUMULATIVE BINOMIAL PROBABILITIES

The tabulated value is $P(X \leqslant r)$ where $X \sim B(n, p)$

	$p =$	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50
$n = 2$	$r = 0$	0.9025	0.8100	0.7225	0.6400	0.5625	0.4900	0.4225	0.3600	0.3025	0.2500
	1	0.9975	0.9900	0.9775	0.9600	0.9375	0.9100	0.8775	0.8400	0.7975	0.7500
	2	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$n = 3$	$r = 0$	0.8574	0.7290	0.6141	0.5120	0.4219	0.3430	0.2746	0.2160	0.1664	0.1250
	1	0.9928	0.9720	0.9393	0.8960	0.8438	0.7840	0.7183	0.6480	0.5748	0.5000
	2	0.9999	0.9990	0.9966	0.9920	0.9844	0.9730	0.9571	0.9360	0.9089	0.8750
	3	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$n = 4$	$r = 0$	0.8145	0.6561	0.5220	0.4096	0.3164	0.2401	0.1785	0.1296	0.0915	0.0625
	1	0.9860	0.9477	0.8905	0.8192	0.7383	0.6517	0.5630	0.4752	0.3910	0.3125
	2	0.9995	0.9963	0.9880	0.9728	0.9492	0.9163	0.8735	0.8208	0.7585	0.6875
	3	1.0000	0.9999	0.9995	0.9984	0.9961	0.9919	0.9850	0.9744	0.9590	0.9375
	4		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$n = 5$	$r = 0$	0.7738	0.5905	0.4437	0.3277	0.2373	0.1681	0.1160	0.0778	0.0503	0.0313
	1	0.9774	0.9185	0.8352	0.7373	0.6328	0.5282	0.4284	0.3370	0.2562	0.1875
	2	0.9988	0.9914	0.9734	0.9421	0.8965	0.8369	0.7648	0.6826	0.5931	0.5000
	3	1.0000	0.9995	0.9978	0.9933	0.9844	0.9692	0.9460	0.9130	0.8688	0.8125
	4		1.0000	0.9999	0.9997	0.9990	0.9976	0.9947	0.9898	0.9815	0.9688
	5			1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$n = 6$	$r = 0$	0.7351	0.5314	0.3771	0.2621	0.1780	0.1176	0.0754	0.0467	0.0277	0.0156
	1	0.9672	0.8857	0.7765	0.6554	0.5339	0.4202	0.3191	0.2333	0.1636	0.1094
	2	0.9978	0.9842	0.9527	0.9011	0.8306	0.7443	0.6471	0.5443	0.4415	0.3438
	3	0.9999	0.9987	0.9941	0.9830	0.9624	0.9295	0.8826	0.8208	0.7447	0.6563
	4	1.0000	0.9999	0.9996	0.9984	0.9954	0.9891	0.9777	0.9590	0.9308	0.8906
	5		1.0000	1.0000	0.9999	0.9998	0.9993	0.9982	0.9959	0.9917	0.9844
	6				1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$n = 7$	$r = 0$	0.6983	0.4783	0.3206	0.2097	0.1335	0.0824	0.0490	0.0280	0.0152	0.0078
	1	0.9556	0.8503	0.7166	0.5767	0.4449	0.3294	0.2338	0.1586	0.1024	0.0625
	2	0.9962	0.9743	0.9262	0.8520	0.7564	0.6471	0.5323	0.4199	0.3164	0.2266
	3	0.9998	0.9973	0.9879	0.9667	0.9294	0.8740	0.8002	0.7102	0.6083	0.5000
	4	1.0000	0.9998	0.9988	0.9953	0.9871	0.9712	0.9444	0.9037	0.8471	0.7734
	5		1.0000	0.9999	0.9996	0.9987	0.9962	0.9910	0.9812	0.9643	0.9375
	6			1.0000	1.0000	0.9999	0.9998	0.9994	0.9984	0.9963	0.9922
	7					1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
$n = 8$	$r = 0$	0.6634	0.4305	0.2725	0.1678	0.1001	0.0576	0.0319	0.0168	0.0084	0.0039
	1	0.9428	0.8131	0.6572	0.5033	0.3671	0.2553	0.1691	0.1064	0.0632	0.0352
	2	0.9942	0.9619	0.8948	0.7969	0.6785	0.5518	0.4278	0.3154	0.2201	0.1445
	3	0.9996	0.9950	0.9786	0.9437	0.8862	0.8059	0.7064	0.5941	0.4770	0.3633
	4	1.0000	0.9996	0.9971	0.9896	0.9727	0.9420	0.8939	0.8263	0.7396	0.6367
	5		1.0000	0.9998	0.9988	0.9958	0.9887	0.9747	0.9502	0.9115	0.8555
	6			1.0000	0.9999	0.9996	0.9987	0.9964	0.9915	0.9819	0.9648
	7				1.0000	1.0000	0.9999	0.9998	0.9993	0.9983	0.9961
	8						1.0000	1.0000	1.0000	1.0000	1.0000

CUMULATIVE BINOMIAL PROBABILITIES

The tabulated value is $P(X \leqslant r)$ where $X \sim B(n, p)$

$p=$		0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50
$n=9$	$r=0$	0.6302	0.3874	0.2316	0.1342	0.0751	0.0404	0.0207	0.0101	0.0046	0.0020
	1	0.9288	0.7748	0.5995	0.4362	0.3003	0.1960	0.1211	0.0705	0.0385	0.0195
	2	0.9916	0.9470	0.8591	0.7382	0.6007	0.4628	0.3373	0.2318	0.1495	0.0898
	3	0.9994	0.9917	0.9661	0.9144	0.8343	0.7297	0.6089	0.4826	0.3614	0.2539
	4	1.0000	0.9991	0.9944	0.9804	0.9511	0.9012	0.8283	0.7334	0.6214	0.5000
	5		0.9999	0.9994	0.9969	0.9900	0.9747	0.9464	0.9006	0.8342	0.7461
	6		1.0000	1.0000	0.9997	0.9987	0.9957	0.9888	0.9750	0.9502	0.9102
	7				1.0000	0.9999	0.9996	0.9986	0.9962	0.9909	0.9805
	8					1.0000	1.0000	0.9999	0.9997	0.9992	0.9980
	9							1.0000	1.0000	1.0000	1.0000
$n=10$	$r=0$	0.5987	0.3487	0.1969	0.1074	0.0563	0.0282	0.0135	0.0060	0.0025	0.0010
	1	0.9139	0.7361	0.5443	0.3758	0.2440	0.1493	0.0860	0.0464	0.0233	0.0107
	2	0.9885	0.9298	0.8202	0.6778	0.5256	0.3828	0.2616	0.1673	0.0996	0.0547
	3	0.9990	0.9872	0.9500	0.8791	0.7759	0.6496	0.5138	0.3823	0.2660	0.1719
	4	0.9999	0.9984	0.9901	0.9672	0.9219	0.8497	0.7515	0.6331	0.5044	0.3770
	5	1.0000	0.9999	0.9986	0.9936	0.9803	0.9527	0.9051	0.8338	0.7384	0.6230
	6		1.0000	0.9999	0.9991	0.9965	0.9894	0.9740	0.9452	0.8980	0.8281
	7			1.0000	0.9999	0.9996	0.9984	0.9952	0.9877	0.9726	0.9453
	8				1.0000	1.0000	0.9999	0.9995	0.9983	0.9955	0.9893
	9						1.0000	1.0000	0.9999	0.9997	0.9990
	10								1.0000	1.0000	1.0000
$n=15$	$r=0$	0.4633	0.2059	0.0874	0.0352	0.0134	0.0047	0.0016	0.0005	0.0001	0.0000
	1	0.8290	0.5490	0.3186	0.1671	0.0802	0.0353	0.0142	0.0052	0.0017	0.0005
	2	0.9638	0.8159	0.6042	0.3980	0.2361	0.1268	0.0617	0.0271	0.0107	0.0037
	3	0.9945	0.9444	0.8227	0.6482	0.4613	0.2969	0.1727	0.0905	0.0424	0.0176
	4	0.9994	0.9873	0.9383	0.8358	0.6865	0.5155	0.3519	0.2173	0.1204	0.0592
	5	0.9999	0.9978	0.9832	0.9389	0.8516	0.7216	0.5643	0.4032	0.2608	0.1509
	6	1.0000	0.9997	0.9964	0.9819	0.9434	0.8689	0.7548	0.6098	0.4522	0.3036
	7		1.0000	0.9994	0.9958	0.9827	0.9500	0.8868	0.7869	0.6535	0.5000
	8			0.9999	0.9992	0.9958	0.9848	0.9578	0.9050	0.8182	0.6964
	9			1.0000	0.9999	0.9992	0.9963	0.9876	0.9662	0.9231	0.8491
	10				1.0000	0.9999	0.9993	0.9972	0.9907	0.9745	0.9408
	11					1.0000	0.9999	0.9995	0.9981	0.9937	0.9824
	12						1.0000	0.9999	0.9997	0.9989	0.9963
	13							1.0000	1.0000	0.9999	0.9995
	14									1.0000	1.0000
$n=20$	$r=0$	0.3585	0.1216	0.0388	0.0115	0.0032	0.0008	0.0002	0.0000	0.0000	0.0000
	1	0.7358	0.3917	0.1756	0.0692	0.0243	0.0076	0.0021	0.0005	0.0001	0.0000
	2	0.9245	0.6769	0.4049	0.2061	0.0913	0.0355	0.0121	0.0036	0.0009	0.0002
	3	0.9841	0.8670	0.6477	0.4114	0.2252	0.1071	0.0444	0.0160	0.0049	0.0013
	4	0.9974	0.9568	0.8298	0.6296	0.4148	0.2375	0.1182	0.0510	0.0189	0.0059
	5	0.9997	0.9887	0.9327	0.8042	0.6172	0.4164	0.2454	0.1256	0.0553	0.0207
	6	1.0000	0.9976	0.9781	0.9133	0.7858	0.6080	0.4166	0.2500	0.1299	0.0577
	7		0.9996	0.9941	0.9679	0.8982	0.7723	0.6010	0.4159	0.2520	0.1316
	8		0.9999	0.9987	0.9900	0.9591	0.8867	0.7624	0.5956	0.4143	0.2517
	9		1.0000	0.9998	0.9974	0.9861	0.9520	0.8782	0.7553	0.5914	0.4119
	10				0.9994	0.9961	0.9829	0.9468	0.8725	0.7507	0.5881
	11				0.9999	0.9991	0.9949	0.9804	0.9435	0.8692	0.7483
	12				1.0000	0.9998	0.9987	0.9940	0.9790	0.9420	0.8684
	13					1.0000	0.9997	0.9985	0.9935	0.9786	0.9423
	14						1.0000	0.9997	0.9984	0.9936	0.9793
	15							1.0000	0.9997	0.9985	0.9941
	16								1.0000	0.9997	0.9987
	17									1.0000	0.9998
	18										1.0000

CUMULATIVE POISSON PROBABILITIES

The tabulated value is $P(X \leqslant r)$ where $X \sim \text{Po}(\lambda)$

$\lambda=$	0.2	0.4	0.5	0.6	0.8	1.0	1.2	1.4	1.5
$r=0$	0.8187	0.6703	0.6065	0.5488	0.4493	0.3679	0.3012	0.2466	0.2231
1	0.9825	0.9384	0.9098	0.8781	0.8088	0.7358	0.6626	0.5918	0.5578
2	0.9989	0.9921	0.9856	0.9769	0.9526	0.9197	0.8795	0.8335	0.8088
3	0.9999	0.9992	0.9982	0.9966	0.9909	0.9810	0.9662	0.9463	0.9344
4	1.0000	0.9999	0.9998	0.9996	0.9986	0.9963	0.9923	0.9857	0.9814
5		1.0000	1.0000	1.0000	0.9998	0.9994	0.9985	0.9968	0.9955
6					1.0000	0.9999	0.9997	0.9994	0.9991
7						1.0000	1.0000	0.9999	0.9998
8								1.0000	1.0000

$\lambda=$	1.6	1.8	2.0	2.2	2.4	2.5	2.6	2.8	3.0
$r=0$	0.2019	0.1653	0.1353	0.1108	0.0907	0.0821	0.0743	0.0608	0.0498
1	0.5249	0.4628	0.4060	0.3546	0.3084	0.2873	0.2674	0.2311	0.1991
2	0.7834	0.7306	0.6767	0.6227	0.5697	0.5438	0.5184	0.4695	0.4232
3	0.9212	0.8913	0.8571	0.8194	0.7787	0.7576	0.7360	0.6919	0.6472
4	0.9763	0.9636	0.9473	0.9275	0.9041	0.8912	0.8774	0.8477	0.8153
5	0.9940	0.9896	0.9834	0.9751	0.9643	0.9580	0.9510	0.9349	0.9161
6	0.9987	0.9974	0.9955	0.9925	0.9884	0.9858	0.9828	0.9756	0.9665
7	0.9997	0.9994	0.9989	0.9980	0.9967	0.9958	0.9947	0.9919	0.9881
8	1.0000	0.9999	0.9998	0.9995	0.9991	0.9989	0.9985	0.9976	0.9962
9		1.0000	1.0000	0.9999	0.9998	0.9997	0.9996	0.9993	0.9989
10				1.0000	1.0000	0.9999	0.9999	0.9998	0.9997
11						1.0000	1.0000	1.0000	0.9999
12									1.0000

$\lambda=$	3.2	3.4	3.5	3.6	3.8	4.0	4.5	5.0	5.5
$r=0$	0.0408	0.0334	0.0302	0.0273	0.0224	0.0183	0.0111	0.0067	0.0041
1	0.1712	0.1468	0.1359	0.1257	0.1074	0.0916	0.0611	0.0404	0.0266
2	0.3799	0.3397	0.3208	0.3027	0.2689	0.2381	0.1736	0.1247	0.0884
3	0.6025	0.5584	0.5366	0.5152	0.4735	0.4335	0.3423	0.2650	0.2017
4	0.7806	0.7442	0.7254	0.7064	0.6678	0.6288	0.5321	0.4405	0.3575
5	0.8946	0.8705	0.8576	0.8441	0.8156	0.7851	0.7029	0.6160	0.5289
6	0.9554	0.9421	0.9347	0.9267	0.9091	0.8893	0.8311	0.7622	0.6860
7	0.9832	0.9769	0.9733	0.9692	0.9599	0.9489	0.9134	0.8666	0.8095
8	0.9943	0.9917	0.9901	0.9883	0.9840	0.9786	0.9597	0.9319	0.8944
9	0.9982	0.9973	0.9967	0.9960	0.9942	0.9919	0.9829	0.9682	0.9462
10	0.9995	0.9992	0.9990	0.9987	0.9981	0.9972	0.9933	0.9863	0.9747
11	0.9999	0.9998	0.9997	0.9996	0.9994	0.9991	0.9976	0.9945	0.9890
12	1.0000	0.9999	0.9999	0.9999	0.9998	0.9997	0.9992	0.9980	0.9955
13		1.0000	1.0000	1.0000	1.0000	0.9999	0.9997	0.9993	0.9983
14						1.0000	0.9999	0.9998	0.9994
15							1.0000	0.9999	0.9998
16								1.0000	0.9999
17									1.0000
18									