1. Population studies have shown that the probability that a member the population served by an NHS trust has a particular disease is p=0.01. The trust would like to screen for the disease, however the only test available is not perfect, it is correct 99% of the time.

   To be specific, if D is the event that a patient has the disease and T is the event that the test indicates that the patient has the disease then

   $$P[T|D] = 0.99 \text{ and } P[\bar{T}|\bar{D}] = 0.99$$

   (a) What is the probability that the test will give a positive result?

   (b) If the test result is positive, what is the probability that the patient actually has the disease?

   (c) It is suggested that if a test is positive then patient should return and have another independent test. What is the chance that the patient has the disease given *two* positive test results?

2. The following data set is believed to come from a Poisson distribution

   $$P[X = k] = \lambda^k e^{-\lambda}/k! \qquad k = 0, 1, 2, 3, \cdots$$

   however it has been suggested that the Binomial might be a better model.

5	3	4	2	1	3	6	5	5	4
7	4	5	7	7	9	2	7	3	3
8	7	4	2	1	7	5	2	7	1
2	4	4	5	7	3	4	4	2	9
5	6	9	4	5	4	5	4	3	4
3	8	3	4	6	6	2	4	5	5
10	7	5	4	5	5	4	6	4	3
6	4	2	7	3	1	7	7	7	6
5	4	3	9	7	3	11	8	3	8
5	6	2	8	3	4	1	4	2	5

   (a) Which model is preferable? Explain your choice.

   (b) Using your preferred model estimate the parameters of the distribution.

3. The two data sets below are believed to have arise from the same distribution?

   (a) Is it plausible to assume the distributions are identical?

   (b) Assuming that the first set is Gamma distributed estimate the parameters of the distribution

Set 1

0.3311	0.556	0.5042	0.496	0.0472	0.212	0.7410	0.4934	0.3955	0.721
0.2309	0.199	0.2132	0.434	0.1297	0.899	0.1792	0.7541	0.1859	0.797
0.1859	0.290	0.2048	0.750	0.3898	0.430	0.7920	0.4235	0.1119	0.331
0.3137	0.270	0.4356	0.368	0.3334	1.217	0.0492	0.3924	0.3068	0.660
0.0347	0.961	1.1336	0.310	0.9659	0.111	0.1270	0.2332	0.1300	0.473
1.2564	0.107	0.3094	0.456	0.1334	0.739	0.2816	0.5290	0.1997	0.174
0.1406	0.813	0.5131	0.291	0.4160	0.286	0.2930	0.3139	0.1715	0.737
0.7403	0.346	0.0662	0.579	0.1529	0.388	0.4196	0.5923	0.2038	0.169
0.2671	0.429	0.0606	0.338	0.3097	0.438	0.1520	0.1706	0.2632	0.730
0.3053	0.403	0.2020	0.108	0.5397	0.242	0.2246	0.0493	0.0804	0.585

Set 2

0.626	0.2083	0.2216	0.5689	0.243	0.3600	0.136	0.695	0.3418	0.070
0.469	0.4996	0.1586	0.1702	0.171	0.4231	0.331	0.213	0.1650	0.679
0.168	0.2150	0.6054	0.8711	0.485	0.8006	0.469	0.147	0.0297	0.213
0.942	0.4902	0.0311	0.4216	0.676	0.3068	0.341	0.402	0.3168	0.266
0.127	0.5488	0.3293	0.0442	0.394	0.6376	0.326	0.128	0.1682	0.145
0.408	0.0117	0.4185	0.3765	0.419	0.0935	0.414	0.172	0.1492	0.158
0.465	0.1152	0.1721	0.2379	0.171	0.3265	0.139	0.130	0.2878	0.156
0.274	0.3895	0.3403	0.1205	1.192	0.5491	0.508	0.163	0.5989	0.538
0.690	0.1834	0.2050	0.6110	0.203	0.5477	0.572	0.285	0.0457	0.267
0.242	0.3268	0.2864	0.0663	0.158	0.2964	0.170	0.613	0.0216	0.609

Solutions to G.Janacek please.

The deadline is 14-06-04 and you can either give solutions to Dr Bagnall or mail them to me. *If you need help please mail me at* `G.Janacek@uea.ac.uk` *or telephone* 01603591206.