Economics

Paper 3 - Statistics - Applied

Wednesday, 6th June, 1951.   8.30 - 11.30 a.m.

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(FOUR questions to be answered. Squared paper and tables
of logarithms will be supplied. Slide rules may be used
where suitable. All arithmetical work must be shown).

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1. Sample of 1,280 working-class families, Bethnal Green, 1929.

No. of dependent children	No. of families
0	638
1	258
2	161
3	111
4	62
5	30
6	12
7	6
8	1
9	1
Total	1,280

Within what limits do you expect the average numbers of
dependent children per family to lie for the area?
   If a sample of 1,500 is taken in another area, giving an
average of 1.20 dependent children, and a standard deviation
of 1.50, is it possible that the average number of dependent
children is the same in the two areas?

2. Duration of trade disputes beginning in 1948, U.K. (from
Ministry of Labour Gazette, May, 1949)

Working days lost Over	Not over	No. of disputes	No.(000's) workers involved	Aggregate no. (000's) of working days lost.
-	1	821	71	62
1	2	378	72	108
2	3	184	37	81
3	4	108	28	95
4	5	93	81	274
5	6	41	12	48
6	12	75	45	232
12	18	22	40	318
18	24	19	38	691
24	-	18	1	29
Total		1,759	425	1,938

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2 (Continued)   Comment on the usefulness of this table for
estimates of the average number of working days lost per
dispute and per worker involved. What is the difference
between the two average concepts? Hence infer if longer
disputes tend to involve more workers.

3.   Births to, and Life-table population of Chinese women in
Singapore in the year 1947.

Age group	No. of women in population (000's)	Female live births	Years lived by 1,000 women in age group according to Life-table L_x
15 -	32,876	2,113	4,250
20 -	26,753	5,428	4,192
25 -	24,470	5,199	4,107
30 -	25,720	4,134	3,990
35 -	25,248	2,869	3,856
40 -	21,635	1,058	3,705
45 - 49	16,086	92	3,535
Total	172,788	20,893	

Compute the gross and net reproduction rates. What inference
can be drawn from these rates as to the replacement of the
Chinese population of Singapore?

4.   The following series show for U.K. total imports, (a) the
declared value, and (b) the value on the basis of average
values in 1930.

Year	Declared value (£ million)	Value on basis of 1930 average value (£ million)
1930	1,044	1,044
1931	861	1,067
1932	702	939
1933	675	946
1934	731	991
1935	756	1,012
1936	848	1,077

Construct index-numbers (1) of average values, and (2) of
volume (quantity) for the years 1931 to 1936 based on
1930 = 100. Discuss the assumptions that are involved in
your calculation.

5. Unemployment and infant mortality in England and Wales, 1933.

Area	Unemployment percentage	Infant Mortality per 1,000
South-West	16.1	49.5
South-East	11.8	51.4
Midland 1	18.1	65.7
Midland 2	16.3	64.2
East	17.8	52.3
North 1	35.8	79.4
North 2	27.9	70.4
North 3	22.0	71.8
North 4	23.4	77.8
Wales 1	37.4	77.9
Wales 2	27.0	63.2

Compute the correlation coefficient between unemployment
and infant mortality in England and Wales for 1933. How
would you interpret your result?

6. Percentage of males (aged 21 and over) in different wage
groups. (Rowntree, Poverty and Progress).

Wage-groups	Complete Survey	Sample Surveys		
		1 in 10	1 in 30	1 in 50
Less than 53s.	39.9	35.9	34.9	37.3
53s. to 59s. 11d.	13.8	13.3	12.0	11.3
60s. to 64s.11d.	9.7	9.6	10.5	8.9
65s. and over	36.6	41.2	42.6	42.5

How far are the proportions obtained by the sample surveys
compatible with the complete survey for each of the wage-
groups? On the results of your calculations can you say
which size sample is to be preferred for similar inquiries?
(The total number in the complete survey was 12,249).

7. Males sentenced to Penal Servitude at Assize and Quarter
    Sessions, England and Wales, 1947.
    (from Criminal Statistics, 1947, Cmd. 7528)

Offence	Length of sentence (years)					Total
	3	4	5	6 and 7	over 7	
Robbery	46	13	19	7	2	87
Forgery	53	28	8	3	-	92
Larceny,fraud,etc.	306	90	49	12	2	459

How can you analyse the above data regarding length of
sentence for each type of crime? Also compare these three
distributions by any method known to you.