Homework Assignment

Statistical Consulting, April 6, 2018

In this homework you have to choose a dataset from the following, perform a through statistical analysis, and produce a high-quality report to a hypothetical client.

Datasets for the following cases are provided in separate files. You may choose any statistical package to perform the analysis.

Your report must include

- an executive summary (1 page only) which describes the objective and the results.
- a brief report (up to 5 pages) with more detailed results, methods, assumptions, and possible limitations. Use visual aids and tables.
- an appendix with the description of the data, the data processing, documented code, etc.
- an invoice for your service which includes the hourly rate, the total number of hours, taxes, etc. (many examples for such invoices are available online. MicroSoft Word even has templates for this).

Problem 1: Work Orders

During the construction phase of a nuclear plant, the number of corrective work orders open should gradually decline until reaching a steady state that would be present during the operational phase. The Nuclear Regulatory Commission has licensing requirements that the number of work orders open at licensing and for operational plants be less than 1000. This number is set to provide a goal indicating operational readiness. The Data (to be downloaded) show the number of work orders for a consecutive 120-working-day period during the construction phase of a nuclear plant.

Client: we need you to provide an estimate for how many days it will take to reach the operational level of 1000 work orders.

Problem 2: Great Britain Transportation fatality

Two modes of transport fatal accident datasets for Great Britain are provided in Table 1 and Table 2. The two modes of transportation have received much public and professional attention.

The rail road accident dataset in Table 1 covers fatal train collisions, derailments and buffer overruns on running lines of the national railway system of Great Britain. The data cover data 1967-2000, in which there were 77 accidents and 308 fatalities.

The road accident dataset in Table 2 covers all fatal road accidents in Great Britain. The full data cover 1969-2000, in which there were 160,160 accidents with 174,828 fatalities.

Client: we want you to check if there are any trends in the accident data.

Problem 3: Salaries

The data in Table 3 show the values of the following variables for 93 employees of a Bank in 1997.

SALARY: beginning salary in dollars

EDUC: years of schooling at the time of hire

EXPER: number of months of previous work experience

TIME: number of months after January 1, 1989, that the individual was hired.

Client: we want to know if there is a relationship between education and beginning salary? We want you to take into account the different levels of experience, and total time an individual was hired.

Table 1: **Train-km; fatal train collision, derailments and overruns; and fatalities: main line railway system : Great Britain (1967-2000)**

Year	Train-km (billion)	Fatal accidents	Fatalities
1967	0.46	7	73
1968	0.45	1	2
1969	0.45	7	17
1970	0.45	2	3
1971	0.44	6	9
1972	0.43	2	7
1973	0.43	3	16
1974	0.45	2	2
1975	0.44	5	11
1976	0.43	2	3
1977	0.42	1	2
1978	0.43	2	4
1979	0.43	3	13
1980	0.43	2	3
1981	0.42	2	5
1982	0.37	2	2
1983	0.40	2	2
1984	0.39	5	22
1985	0.42	0	0
1986	0.41	2	2
1987	0.40	1	4
1988	0.44	2	36
1989	0.44	4	10
1990	0.43	1	1
1991	0.44	2	6
1992	0.43	1	1
1993	0.43	0	0
1994	0.42	2	7
1995	0.42	1	1
1996	0.44	2	2
1997	0.46	1	7
1998	0.49	0	0
1999	0.50	1	31
2000	0.51	1	4

Table 2: **Road motor vehicle-km, fatal accidents and fatalities: Great Britain (1969-2000)**

Year	Motor vehicle-km (billion)	Fatal accidents	Fatalities
1969	192.6	6768	7365
1970	200.5	6879	7499
1971	212.0	7015	7699
1972	222.5	7109	7763
1973	234.0	6771	7406
1974	229.8	6336	6883
1975	231.7	5831	6366
1976	243.5	6009	6570
1977	246.9	6089	6614
1978	256.5	6297	6831
1979	255.9	5824	6352
1980	271.9	5560	6010
1981	276.9	5355	5846
1982	284.5	5447	5934
1983	288.1	5027	5445
1984	303.1	5138	5599
1985	309.7	4768	5165
1986	325.3	4895	5382
1987	350.5	4694	5125
1988	375.7	4643	5052
1989	406.9	4907	5373
1990	410.8	4748	5217
1991	411.6	4158	4568
1992	412.1	3855	4229
1993	412.2	3470	3814
1994	422.6	3326	3650
1995	430.9	3286	3621
1996	442.5	3274	3598
1997	452.5	3298	3599
1998	459.2	3137	3421
1999	467.0	3138	3423
2000	468.7	3108	3409

Table 3: **Data for the Salary Exercise**

SALARY	EDUC	EXPER	TIME	SALARY	EDUC	EXPER	TIME
39000	12	0.0	1	48000	12	144.0	24
40200	10	44.0	7	48000	12	163.0	12
42900	12	5.0	30	48000	12	288.0	26
43800	8	6.2	7	48000	12	381.0	1
43800	8	7.5	6	48000	16	214.0	15
43800	12	0.0	7	49800	8	318.0	25
43800	12	0.0	10	51000	8	96.0	33
43800	12	4.5	6	51000	12	36.0	15
44400	15	75.0	2	51000	12	59.0	14
45000	8	52.0	3	51000	15	115.0	1
45000	12	8.0	19	51000	15	165.0	4
46200	12	52.0	3	51000	16	123.0	12
48000	8	70.0	20	51600	12	18.0	12
48000	12	6.0	23	52200	8	102.0	29
48000	12	11.0	12	52200	12	127.0	29
48000	12	11.0	17	52800	8	90.0	11
48000	12	63.0	22	52800	8	190.0	1
52800	12	107.0	11	51000	12	315.0	2
54000	8	173.0	34	52200	12	29.0	14
54000	8	228.0	33	54000	12	7.0	21
54000	12	26.0	11	54000	12	38.0	11
54000	12	36.0	33	54000	12	113.0	3
54000	12	38.0	22	54000	15	17.5	8
54000	12	82.0	29	54000	15	359.0	11
54000	12	169.0	27	57000	15	36.0	5
54000	12	244.0	1	60000	8	320.0	21
54000	15	24.0	13	60000	12	24.0	2
54000	15	49.0	27	60000	12	32.0	17
54000	15	51.0	21	60000	12	49.0	8
54000	15	122.0	33	60000	12	56.0	33
55200	12	97.0	17	60000	12	252.0	11
55200	12	196.0	32	60000	12	272.0	19
55800	12	132.5	30	60000	15	25.0	13
56400	12	55.0	9	60000	15	35.5	32
57000	12	90.0	23	60000	15	56.0	12
57000	12	116.5	25	60000	15	64.0	33
57000	15	51.0	17	60000	15	108.0	16
57000	15	61.0	11	60000	16	45.5	3
57000	15	241.0	34	63000	15	72.0	17
60000	12	121.0	30	66000	15	64.0	16
60000	15	78.5	13	66000	15	84.0	33
61200	12	208.5	21	66000	15	215.5	16
63000	12	86.5	33	68400	15	41.5	7
63000	15	231.0	15	69000	12	175.0	10
46200	12	11.5	22	69000	15	132.0	24
50400	15	14.0	3	81000	16	54.5	33
51000	12	180.0	15				