MTH 441: Lab 11: Poisson Regression

P 1. Consider the Aircraft Damage Data in which the response variable is the number of locations where damage was inflicted on the aircraft. The regressor x_1 is an indicator variable (type of aircraft), and the other regressors x_2 and x_3 are bomb load (in tons) and total months of aircrew experience. Fit Poisson regression model and test the hypothesis for the significance of regressors.

Table 1: The Aircraft Damage Data.

Observation	y	x_1	x_2	x_3
1	0	0	4	91.5
2	1	0	4	84.0
3	0	0	4	76.5
4	0	0	5	69.0
5	0	0	5	61.5
6	0	0	5	80.0
7	1	0	6	72.5
8	0	0	6	65.0
9	0	0	6	57.5
10	2	0	7	50.0
11	1	0	7	103.0
12	1	0	7	95.5
13	1	0	8	88.0
14	1	0	8	80.5
15	2	0	8	73.0
16	3	1	7	116.1
17	1	1	7	100.6
18	1	1	7	85.0
19	1	1	10	69.4
20	2	1	10	53.9
21	0	1	10	112.3
22	1	1	12	96.7
23	1	1	12	81.1
24	2	1	12	65.6
25	5	1	8	50.0
26	1	1	8	120.0
27	1	1	8	104.4
28	5	1	14	88.9
29	5	1	14	73.7
30	7	1	14	57.8

P 2. Following Table contains data from an experiment conducted to investigate the three factors x_1 = length, x_2 = amplitude, and x_3 = load on the cycles to failure y of worsted yarn. The regressor variables are coded, and readers who have familiarity with designed experiments will recognize that the experimenters here used a 3^3 factorial design. Fit a GLM using the gamma distribution and the log link.

Table 2: Data from the Worsted Yarn Experiment.

x_1	x_2	x_3	y
-1	-1	-1	674
0	-1	-1	1414
1	-1	-1	3636
-1	0	-1	338
0	0	-1	1022
1	0	-1	1568
-1	1	-1	170
0	1	-1	442
1	1	-1	1140
-1	-1	0	370
0	-1	0	1198
1	-1	0	3184
-1	0	0	266
0	0	0	620
1	0	0	1070
-1	1	0	118
0	1	0	332
1	1	0	884
-1	-1	1	292
0	-1	1	634
1	-1	1	2000
-1	0	1	210
0	0	1	438
1	0	1	566
-1	1	1	90
0	1	1	220
1	1	1	360