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Phys338/Homework #8

Due on Wednesday 9/12/2020

Consider that you would like to predict the mass (M) of a specific model aircraft by measuring its average acceleration during take-off (a) and its slope (s). To improve your prediction, you also take into consideration that airspeed relative to the craft at takeoff (v) and the air density (ρ). Below is a table summary of these data taken from actual flights

M (kg)	a (g)	s	$v(km/h)$	$\rho\ (\frac{kg}{m^3})$
67290.91	0.216	-0.0016192	89.53	1.25
67828.82	0.211	-0.0014728	89.11	1.25
56629.49	0.261	-0.0022519	89.96	1.24
63580.02	0.204	-0.0015445	85.42	1.27
66518.83	0.201	-0.0016178	86.3	1.28
57042.28	0.196	-0.0017481	84.14	1.25
57709.09	0.237	-0.0019591	88.06	1.23
63551.13	0.207	-0.0015048	86.52	1.22
54550.17	0.199	-0.0020914	82.75	1.21

Assuming that the mass of the aircraft depends linearly on the aforementioned parameters (i.e. $M = c_0 + c_1 a + c_2 s + c_3 v + c_4 \rho$).

1) Find the least square fit values of $c_0, c_1, c_2, c_3\ and\ c_4$ by constructing and solving the appropriate linear system in matlab script (or your own code).

2) The following is an additional flight information

M (kg)	a (g)	s	$v(km/h)$	$\rho\ (\frac{kg}{m^3})$
57715.48	0.209	-0.0014874	83.52	1.24

How good is your model in predicting the mass of the aircraft?