Homework 6 - Approximation Theory

Work,

Burden-Faires: 8.1.6 Do all 5 models. For Parts a-c, find the eigenvalues and condition numbers for your matrices $A^T A$, then compare the 3 polynomial models with the Bayesian and Akaike Information Criteria.

Problem 1: Consider the population of the U. S. given by the Census Bureau for the history of the U. S. Below is a table of the data: Repeat the **complete** process with the 5 models examined

Year	Census	Year	Census	Year	Census
1790	3.93	1870	39.82	1950	151.33
1800	5.31	1880	50.16	1960	179.32
1810	7.24	1890	62.95	1970	203.30
1820	9.64	1900	75.99	1980	226.55
1830	12.87	1910	91.97	1990	248.71
1840	17.07	1920	105.71	2000	281.42
1850	23.19	1930	122.78		
1860	31.43	1940	131.67		

Table 1: U. S. Census Data with population in millions.

in the previous problem with this data set. Create your models with $t = 0$ corresponding to 1790. For the power law model, use the form

$$P_p(t) = a(t + 10)^b$$

to avoid the problem that $P_p(0) = 0$. (Cannot take the logarithm of 0.) Which model do you consider to be the best and why?

Burden-Faires: 8.2.2(a,e), 4(a,e), 6(a,e), 7(b), 8(d), 10(d) (Problems 8(d) and 10(d) refer to only using the function in Problem 1(d).)

Burden-Faires: 8.3.2(b), 4(b)

Burden-Faires: 8.4.2