Math 5110 Applied Linear Algebra

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Homework -Least Squares

Using Python or Matlab for the calculations of matrices.

Using Mathematica or `https://www.wolframalpha.com/` help the calculation of integrals.

Question 1. The following data were collected for the mean annual temperature t and rainfall r in a certain region; use the Method of Least Squares to find a **linear** approximation for r in terms of t.

t	24	27	22	24
r	47	30	35	38

Question 2. In a tropical rain forest the following data were collected for the numbers x and y (per square kilometer) of a prey species and a predator species over a number of years. Use least squares to find a **quadratic** function of x that approximates y.

x	2	4	3	5
y	1	2	2	1

Question 3. Find a least squares approximation to the function e^{-x} by a linear function in the interval $[1, 2]$.

Use the inner product $\langle f, g \rangle = \int_1^2 f(x)g(x)dx$

Question 4. Find a least square approximation for the function $\sin x$ as a quadratic function of x in the interval $[0, \pi]$. Use the inner product $\langle f, g \rangle = \int_0^\pi f(x)g(x)dx$