

Math 294 Exercises on Least Squares Minimization

1. Use the normal equations to find the line that best fits the set of points

$$\{(0, 0), (1, 8), (3, 8), (4, 20)\}.$$

Clearly state the linear system $Ax = b$ involved here and your least squares solution. What is the norm of the residual $\|Ax - b\|$?

2. Use calculus to solve the same problem by expanding out $\|Ax - b\|^2$ as a function of the line's coefficients, then setting the two partial derivatives equal to zero and solving.
3. Find the least square solution for the plane that best fits the set of points

$$\{(1, 0, 0), (0, 1, 1), (-1, 0, 3), (0, -1, 4)\}.$$