

MATH 240 Assignment 6, Spring 2016

Please put your name and student ID at the top of the front page and staple your assignment together.

Please hand in to the dropoff boxes outside AQ 4135 by 6pm Tuesday April 12th.

Michael Monagan

6.1 Exercises 5, 10, 14, 19, 21, 28, 31.

6.2 Exercises 8, 12, 13, 18, 20, 23, 25, 27.

6.3 Exercises 2, 4, 7, 12, 15, 17, 21, 22.

6.4 Exercises 3, 7, 10, 17.

6.5 Exercises 4, 8, 17.

6.6 Consider the four data points $(0,0)$, $(1,5)$, $(2,8)$, $(3,9)$.

- (a) Fit the data with a line $y = c + ax$ using the method of least-squares. Let $Ax = b$ be the linear system. You should get $\hat{x} = [1, 3]$ corresponding to the line $y = 3x + 1$. Calculate the least-squares error $\|b - A\hat{x}\|$.
- (b) Fit the data with a quadratic $y = c + bx + ax^2$ using the method of least squares. Let $Qx = z$ be the corresponding linear system. You should get $\hat{x} = [0, 6, -1]$ corresponding to the quadratic $y = 6x - x^2$. Calculate the least-squares error $\|z - Q\hat{x}\|$.
- (c) Now try to solve the two linear systems $Ax = b$ and $Qx = z$ for x . You should find that $Ax = b$ has no solution but $Qx = z$ does have a solution even though the linear system $Qx = z$ is over determined. Interpret this result. Is it consistent with the square error from part (b)?