

Concerns: Hand in a Word document **showing the requested items only** .
Do not give any hand written answers.

The assignment:
Using the six data points

$(d_1 + 1, d_1 + 1), (d_2 + 1, 2d_2 + 1), (d_3 + 1, 3d_3 + 1) (d_4 + 1, 4d_4 + 1) (d_5 + 1, 5d_5 + 1) (d_6 + 1, 6d_6 + 1)$

where $d_1d_2d_3d_4d_5d_6$ are the 6 digits of ID number.

For example if your ID # is 156024 then your 6 points are

$(1+1,1+1), (5+1,2*5+1), (6+1,3*6+1), (0+1,4*0+1), (2+1,5*2+1), (4+1,6*4+1)$
or $(2,2), (6,11), (7,19), (1,1), (3,11), (5,25)$

Find the following regression functions , their graphs, and $y(7) = ?$ for each.

- 1. $y = ax^4 + bx^2 + cx$ using the Linear Algebra procedure described in our text Thrm 5.14
- 2. a) $y = ax^3 + bx^2 + cx + d$ using calculus to minimize SSD
b) $y = ax^3 + bx^2 + cx + d$ using the Linear Algebra procedure described in our text Thrm 5.14
- 3. $y = a + b \ln(x)$ using the Linear Algebra procedure described in our text Thrm 5.14
- 4. $y = ae^{bx}$ using the Linear Algebra procedure described in our text Thrm 5.14
(see problem #13 pg 357 of text for a hint for how to do this part)

What is to be handed in on paper a Word document:

For problems 1, 2.b), 3, and 4 **show only the material asked for in bold print;**
(check to be sure that rank(A) satisfies Thrm 5.14 in each case)

Show the matrices A, and B with exact entries (no rounding) as obtained from converting your original system of equations into the single matrix equation $AX = B$.

Show the matrix X of solutions (**only if its entries are fractions**)

Show the exact values for a, b, c, if fractions, otherwise give each to 5 decimal places

Show a graph of your equation (using exact values for a, b, c, ...) on top of a scatter plot of the original 6 points. (scale it so the points and the equation are clearly visible)

Show what $y = ?$ when $x = 7$ (if it is a fraction give it, if not give y to 5 decimal places)

For problem 2.a) ;

Show a table similar to the one below. With the expressions with $f(x_i) - y_i$ and the expanded form of $[f(x_i) - y_i]^2$ copied from your maple doc. Since the expanded forms are lengthy you may wish to use 'landscape' orientation for creating the table .

i	x_i	y_i	$f(x_i) - y_i$	$[f(x_i) - y_i]^2$
1	x_1	y_1	?	?
2	x_2	y_2	?	?
3	x_3	y_3	?	?
.	.	.	?	?
.	.	.	?	?
.	.	.	?	?

Total = ? = SSD

Show $SSD = ?$ Expanded.

Then show $SSD'_a = ? SSD'_b = ? SSD'_c = ? SSD'_d = ?$ expanded

Then solve the 4 simultaneous equations $SSD'_a = 0 \quad SSD'_b = 0 \quad SSD'_c = 0 \quad SSD'_d = 0$ for $a, b, c,$ and d .

For this last step, **show the augmented matrix of the set of equations,** then **show its row reduced matrix,** and finally **show the exact values for $a, b, c,$ and d .**