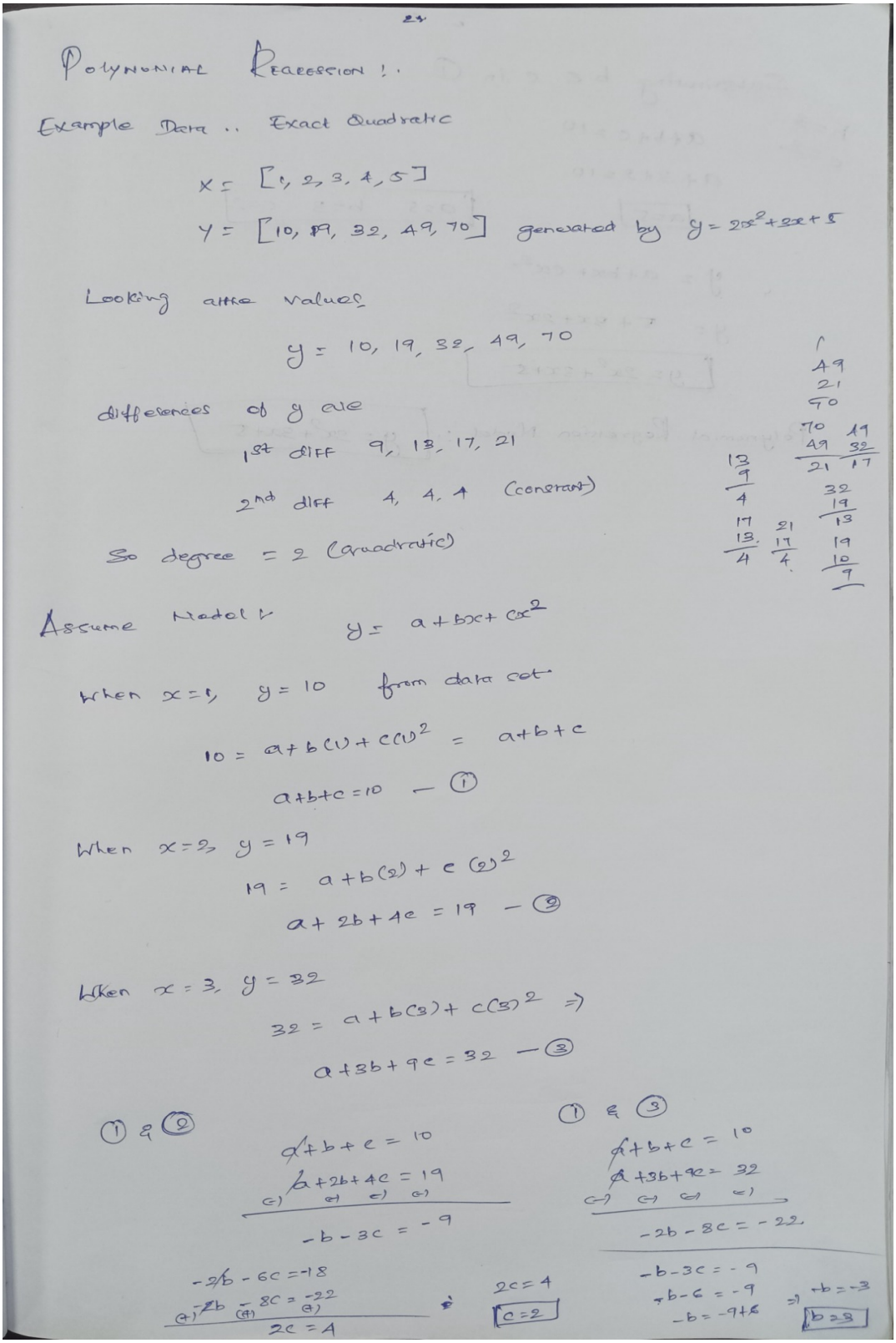
Assignment: Polynomial Regression



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Polynomial Regression :-

Example Data .. Exact Quadratic

$x = [1, 2, 3, 4, 5]$

$y = [10, 19, 32, 49, 70]$ generated by $y = 2x^2 + 2x + 5$

Looking at the values

$y = 10, 19, 32, 49, 70$

differences of y are

1st diff 9, 13, 17, 21

2nd diff 4, 4, 4 (constant)

So degree = 2 (quadratic)

Assume Model :- $y = a + bx + cx^2$

When $x = 1$, $y = 10$ from data set.

$10 = a + b(1) + c(1)^2 = a + b + c$

$a + b + c = 10$ — (1)

When $x = 2$, $y = 19$

$19 = a + b(2) + c(2)^2$

$a + 2b + 4c = 19$ — (2)

When $x = 3$, $y = 32$

$32 = a + b(3) + c(3)^2 \Rightarrow$

$a + 3b + 9c = 32$ — (3)

(1) & (2)

$a + b + c = 10$

$a + 2b + 4c = 19$

(2) − (1), (3) − (1)

$-b - 3c = -9$

(1) & (3)

$a + b + c = 10$

$a + 3b + 9c = 32$

(3) − (1), (4) − (1)

$-2b - 8c = -22$

$-2b - 6c = -18$

(4) − (3)

$-2c = -4$

$2c = 4$

$c = 2$

$-b - 3c = -9$

$-b - 6 = -9$

$-b = -9 + 6$

$b = 3$

Substituting b & c in ①

$b=3$
$c=2$

$a+b+c=10$

$a+3+2=10$

$\boxed{a=5}$

$\boxed{a=5 \quad b=3 \quad c=2}$

$y = a+bx+cx^2$

$y = 5+3x+2x^2$

$\boxed{y = 2x^2+3x+5}$

Polynomial Regression Model : $\boxed{y = 2x^2+3x+5}$