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PART A & B

1.

x	1	2	3	5	6
f(x)	4.75	4	5.25	15.5	24

To fit a quadratic polynomial it is enough to have three points, we may use the first three points or last three points for the purpose or middle three.

Suppose we use the first three points.

$$f(x) = a_0 + a_1 x + a_2 x^2$$

at $x=1$, $f(1) = 4.75$; $x=2$, $f(2)=4$

and $x=3$, $f(5) = 5.25$

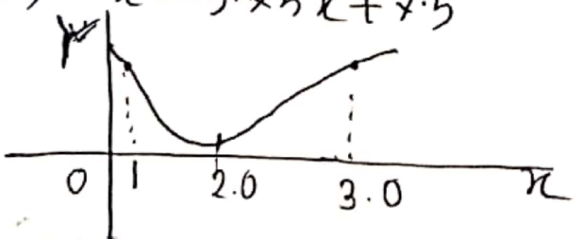
$$a_0 + a_1 + a_2 = 4.75$$
$$a_0 + 2a_1 + 4a_2 = 4$$
$$a_0 + 3a_1 + 4a_2 = 5.25$$

Solving this system (By cramer's rule or any other method). we may get the values of a_0, a_1, a_2

We use matrix alpha to get them

$$a_0 = 7.5, \quad a_1 = -3.75, \quad a_2 = 1$$

$$f(x) = x^2 - 3.75x + 7.5$$

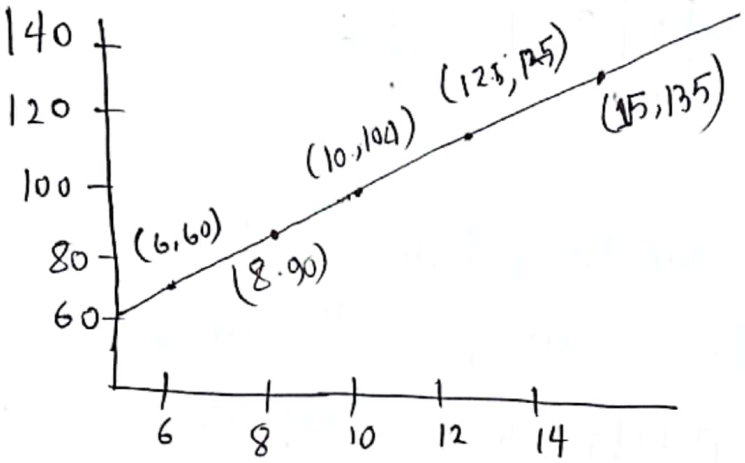


Section-B

(2)

t	6	8	10	12.5	15
D	60	90	104	12.5	135

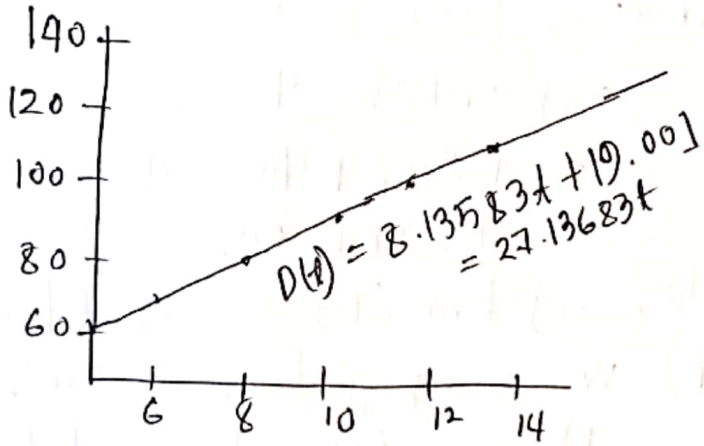
(a)



(b) $K_1 = 19.001$, $K = 8.13583$

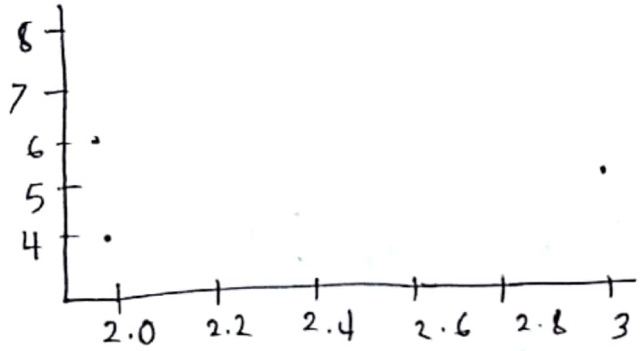
(c) $D(t) = 8.13583t + 19.001 = 27.136837t$ using formula

(d)

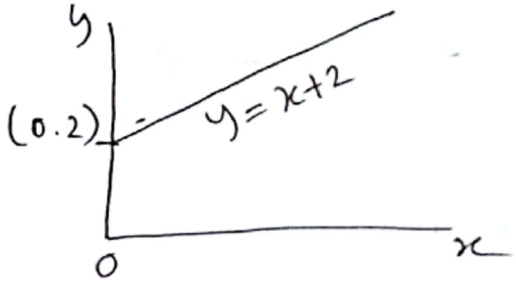


Section A

4) a) (2.4) (3.6), (2, 6), (3.8)



(b)



(c) Residuals (squared)

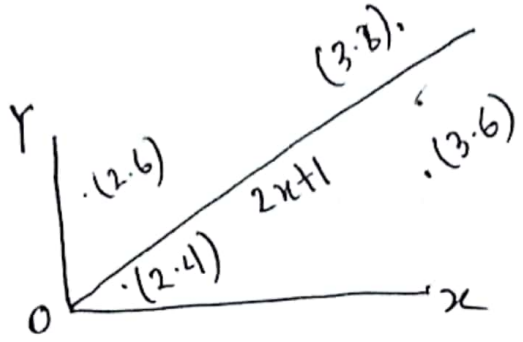
$f(x) = x+2$; $(f(2)-4)^2 = 0$

$(f(2)-6)^2 = (-2)^2 = 4$

$(f(3)-6)^2 = (5-1)^2 = 1$

$(f(3)-8) = (5-8) = 9$

(d) if in not best fit b/e the sum of the residuals may be minimized using linear regression model $y = 2x+1$



2. a. $f(n) = 30 \ln\left(\frac{230}{230.8}\right) - 2.5t$

a. $\frac{8}{2}\left[f(12) + f(4)\right]$

$= 198.827$

b. $\int_4^{12} f(x)\,dx = -80.235$

c. Time error

$185.65 - 198.827$

$= -12.62$

d. $\frac{|-12.62|}{185.65} = \frac{12.62}{185.65} = .068$

$= 6.8\%$