(3)

v	54.3	61.8	72.4	88.7	118.6	194
P	61.2	49.5	37.5	28.4	19.2	10.1

given: $Pv^n = c$

(a) taking log on both sides

$$\log(Pv^n) = \log(c) = K \text{ (constant)}$$

$$\log(P) + n\log(V) = K$$

$$\log(P) = K - n\log(V)$$

so, let $h(V) = K - n\log(V)$

let $\log V = V'$

$$h(V') = K - nV'$$

comparing with $W_0 + W_1 x$

$$J = \frac{1}{2m}\sum_{i=1}^{m}(K + n'V' - P')^2$$

where $P' = \log P$

$V' = \log V$

$n' = -n$

on solving $\frac{\partial J}{\partial K} = 0$ and $\frac{\partial J}{\partial n'} = 0$

we get, $K = 9.67592 \Rightarrow \log(c) = 9.67592$

$n' = -1.40371 \Rightarrow n = 1.40371$

$\Rightarrow n = 1.40371$, $c = 15929.3723241$

(b) So, $P \cdot V^{1.40371} = 15929.3723241$ —(1)

is the equation connecting P & V

(c) given $V = 100$

using equation 1

$$P = \frac{15929.3723241}{(100)^{1.40371}} \approx 24.81867$$

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(4)

X	0	1	2	3	4	5	6
Y	2.4	2.1	3.2	5.6	9.3	14.6	21.9

$$Y = W_0 + W_1 x + W_2 x^2$$

$$J = \frac{1}{2m} \sum_{i=1}^{m} \left(\omega_0 + \omega_1 x_i + \omega_2 x_i^2 - y_i \right)^2$$

$$\frac{\partial J}{\partial \omega_0} = \frac{1}{2m} \sum_{i=1}^{m} 2\left(\omega_0 + \omega_1 x_i + \omega_2 x_i^2 - y_i\right)(1)$$

$$\frac{\partial J}{\partial \omega_1} = \frac{1}{2m} \sum_{i=1}^{m} 2\left(\omega_0 + \omega_1 x_i + \omega_2 x_i^2 - y_i\right)(x_i)$$

$$\frac{\partial J}{\partial \omega_2} = \frac{1}{2m} \sum_{i=1}^{m} 2\left(\omega_0 + \omega_1 x_i + \omega_2 x_i^2 - y_i\right)(x_i^2)$$

Solving $\frac{\partial J}{\partial \omega_0} = 0$, $\frac{\partial J}{\partial \omega_1} = 0$, $\frac{\partial J}{\partial \omega_2} = 0$