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1. $f(t) = 480\sin\left(\frac{\pi t}{180}\right) + 160\left(1 - \frac{t}{180}\right) - 480$ (+10)

iter	a	b	m	f(a)	f(b)	f(m)
0	1	75	38	-312.5	+76.98	-58.26
1	38	75	56.5	-58	+77	+30
2	38	56.5	47.25	-58	+30	-9.5
3	47.25	56.5	51.875	-9.5	+30	+11.5

← (+1 each)

$m = 49.56$ (+1)

2. $V_z = \frac{c_1}{z} + c_2 z^2 + c_3 z + c_4$ (40)

(+10) $\underset{\approx}{A} = \begin{pmatrix} \frac{1}{z_1} & z_1^2 & z_1 & 1 \\ \frac{1}{z_2} & z_2^2 & z_2 & 1 \\ \vdots & \vdots & \vdots & \vdots \\ \frac{1}{z_n} & z_n^2 & z_n & 1 \end{pmatrix}$ (+2) $\underset{\sim}{V_z} = \begin{pmatrix} V_z^{(1)} \\ V_z^{(2)} \\ \vdots \\ V_z^{(n)} \end{pmatrix}$

(+9) $c = \underbrace{\left[\underset{\approx}{A}^T \underset{\approx}{A}\right]^{-1} \underset{\approx}{A}^T}_{\underset{\approx}{K}} \underset{\sim}{V_z} = \underset{\approx}{K}\,\underset{\sim}{V_z}$

(+5) $\sigma_v^2 = s_v^2 = \frac{1}{n-4}\left(\underset{\approx}{A}\,\underset{\sim}{c} - \underset{\sim}{V_z}\right)^T\left(\underset{\approx}{A}\,\underset{\sim}{c} - \underset{\sim}{V_z}\right)$

(+5) $\underset{\approx}{\Sigma}_c^2 = \sigma_v^2\,\underset{\approx}{K}\,\underset{\approx}{K}^T$

(+5) $\underset{\approx}{\Sigma}_{V_z^m}^2 = \underset{\approx}{A}^{(m)}\,\underset{\approx}{\Sigma}_c^2\,\underset{\approx}{A}^{(m)T}$ where $\underset{\approx}{A}^{(m)} = \begin{pmatrix} \frac{1}{z_1} & z_1^2 & z_1 & 1 \\ \frac{1}{z_2} & z_2^2 & z_2 & 1 \\ \vdots & \vdots & \vdots & \vdots \\ \frac{1}{z_m} & z_m^2 & z_m & 1 \end{pmatrix}$ (+2)

↑ at z points where we want a prediction

(+2) $\underset{\sim}{\sigma}_{V_z^{(m)}}^2 = \text{diag}\left\{\underset{\approx}{\Sigma}_{V_z^{(m)}}^2\right\}$

3. $S_d^2 = \left(\frac{\partial f}{\partial V}\Big|_{\bar{V}}\right)^2 S_V^2$ (+4)

(15)

$d = f(V) = \left(\frac{6V}{\pi}\right)^{1/3}$

$\frac{\partial f}{\partial V} = \frac{1}{3}\frac{6}{\pi}\left(\frac{6V}{\pi}\right)^{-2/3}$ (+4) @ $\bar{V} \rightsquigarrow \frac{1}{3}\frac{6}{\pi}\left(\frac{6\bar{V}}{\pi}\right)^{-2/3}$

$\rightsquigarrow S_d^2 = \frac{1}{9}\frac{36}{\pi^2}\left(\frac{6\bar{V}}{\pi}\right)^{-4/3} S_V^2$

$\bar{d} = \left(\frac{6 \cdot 623.6}{\pi}\right)^{1/3} = 10.6\ \mu m$

$S_d^2 = 3.21 \times 10^{-5} \cdot (2\,[illegible].1)^2 = 2.68$

$S_d = 1.64\ \mu m$ (+4)

$\rightsquigarrow \bar{d} = 10.6 \pm 1.6\ (s.d)\ \mu m$