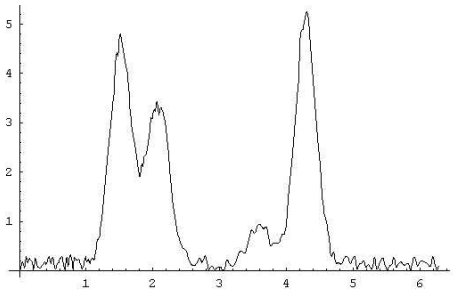
Practice Work 2 – Data Analysis

Answers

Note that these answers may vary, depending on the details of your calculation, for example on the way you have chosen to eliminate the overlap.

First Task

The graph of the interpolating function $f(\theta)$:



The areas and volumes of the devices:

$A_1 = 112.8 \pm 0.5\text{cm}^2$
$A_2 = 139.0 \pm 0.4\text{cm}^2$
$A_3 = 86.4 \pm 0.4\text{cm}^2$
$V_1 = 3551 \pm 13\text{cm}^3$
$V_2 = 4865 \pm 14\text{cm}^3$
$V_3 = 2470 \pm 11\text{cm}^3$

Second Task

Integral of the interpolating function over the angle variable

$$\int_0^{2\pi} f(\theta)\, d\theta = 6.4\text{m}^{-2}\text{s}^{-1}$$

Total number of particle in one year: $1.0 \cdot 10^{23}$.

Third Task

Gaussian Minimum error with $g_w = 11.8$:

$$\begin{aligned} g(x) = {} & 3.9e^{-11.8(x-1.7)^2} + 3.0e^{-11.8(x-2.4)^2} \\ & + 0.7e^{-11.8(x-3.8)^2} + 4.7e^{-11.8(x-4.5)^2} + 0.1 \end{aligned}$$

Lorenzian Minimum error with $l_w = 20.6$:

$$\begin{aligned} l(x) = {} & \frac{4.1}{1 + 20.6(x-1.7)^2} + \frac{2.9}{1 + 20.6(x-2.4)^2} \\ & + \frac{0.3}{1 + 20.6(x-3.8)^2} + \frac{5.2}{1 + 20.6(x-4.5)^2} - 0.2 \end{aligned}$$