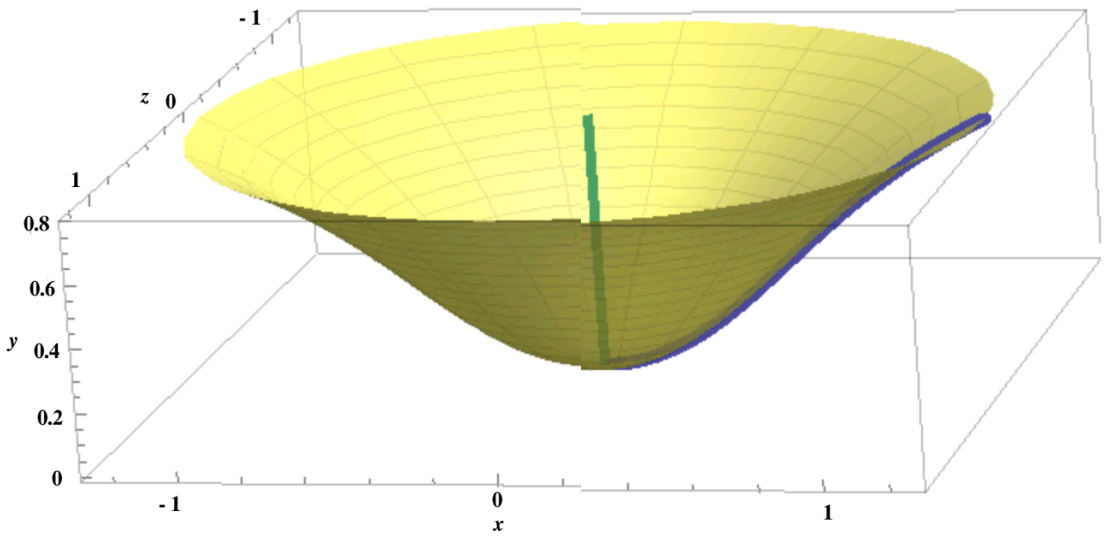
Chapter 4

Further A-Level Pure Mathematics : Core 1

Volumes of Revolution

4.1 Revolving Integration By Parts



Find the exact volume swept out by the part of the following profile curve between the bounding lines given when it is rotated by $2\pi^c$ about the y-axis.

$$x = \frac{\sqrt{y}}{\cos y}, \qquad y = 0, \qquad y = \frac{\pi}{4}$$

Teaching Video : http://www.NumberWonder.co.uk/v9087/4.mp4

[10 marks]

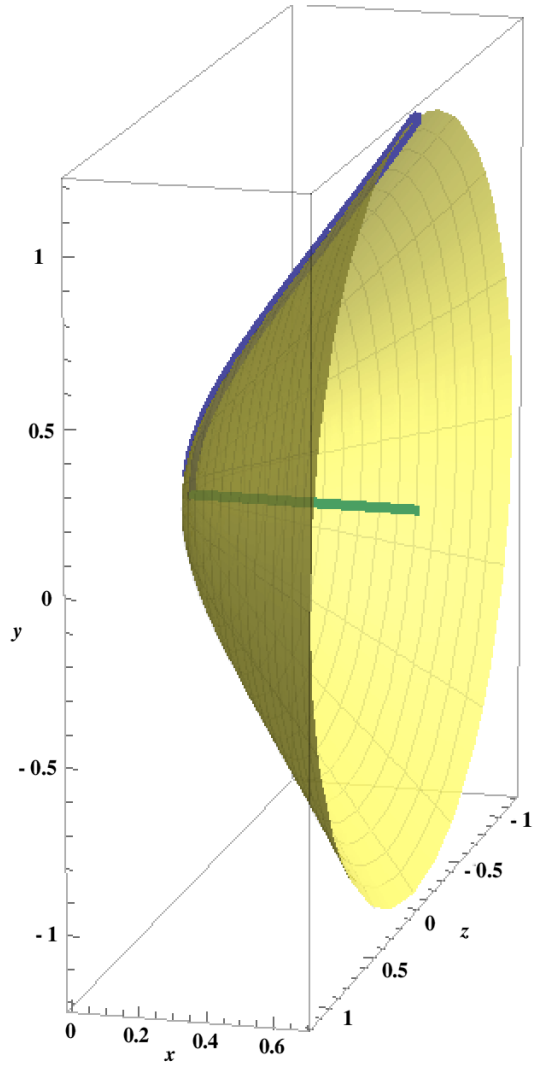
4.2 Exercise

Any solution based entirely on graphical
or numerical methods is not acceptable

Marks Available : 30

Question 1

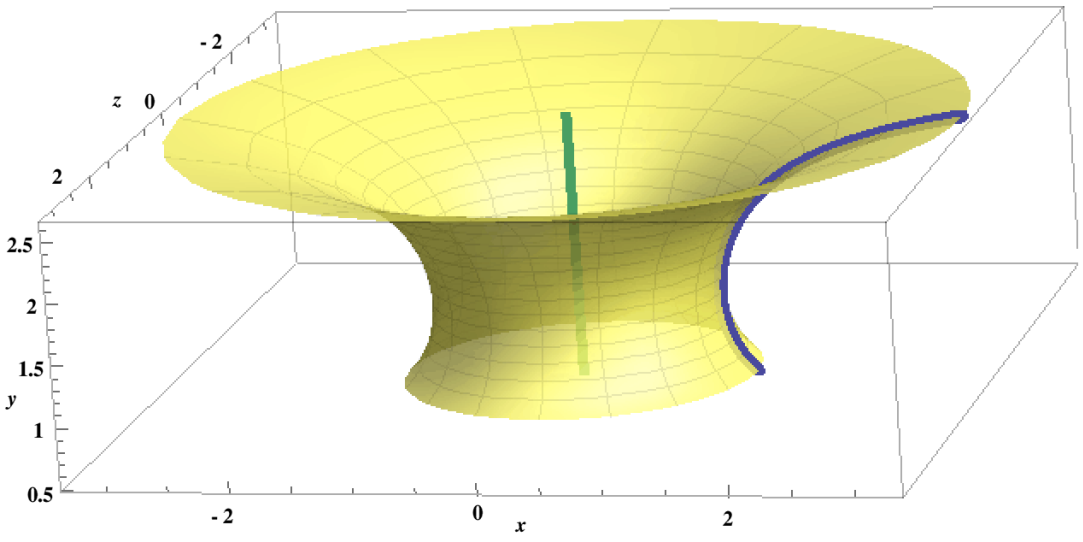
Show that the volume swept out by the curve $y = \sqrt{x}\, e^{\frac{x}{2}}$ between $x = 0$ and $x = ln\, 2$ when it is rotated by $2\pi^c$ about the x-axis is exactly, $\pi\,(\,2ln\,(2) - 1\,)$



[10 marks]

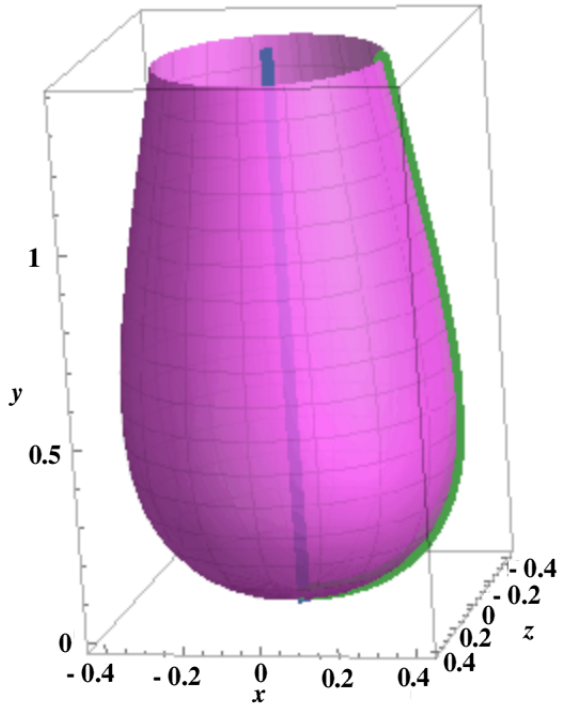
Question 2

Show that the volume swept out by the curve $x = \dfrac{\sqrt{y}}{\sin y}$ between $y = \dfrac{\pi}{6}$ and $y = \dfrac{5\pi}{6}$ when it is rotated by $2\pi^c$ about the y-axis is exactly, $\pi^2\sqrt{3}$



[10 marks]

Question 3



Show that the volume swept out by the curve $x = \sqrt{y}\ e^{-y}$ between $y = 0$ and $y = ln\,4$ when it is rotated by $2\pi^c$ about the y-axis is exactly, $\frac{\pi}{64}(15 - 2\,ln\,4)$

[10 marks]

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