C4 Parametric Integration

Mostly stolen from the Smedley, Wiseman textbook.

1. A curve is given by $x = 3t - 1, y = t^2 + 1$. Calculate the area of the region enclosed by the curve and the x-axis between the lines $x = 2$ and $x = 8$. $\boxed{32}$

2. A curve is given by $x = t + 2, y = t^3 - 3$. Calculate the area of the region enclosed by the curve and the x-axis between the lines $x = 4$ and $x = 6$. $\boxed{54}$

3. A curve is given by $x = 6t - t^3, y = 2 + t^2$. Calculate the area of the region under the curve between the point where $t = -1$ and the point where $t = 1$. $\boxed{\frac{114}{5}}$

4. (a) Find the area of the finite region, R, bounded by the curve $x = 2t + 1, y = t^2 - 3$, the lines $x = 3$ and $x = 7$, and the x-axis. $\boxed{\frac{16}{3}}$

   (b) Find also the volume of solid generated when R is rotated through 360° about the x-axis. $\boxed{\frac{144\pi}{5}}$

5. (a) Find the area of the finite region, R, bounded by the curve $x = 1 + 2t, y = 1 + \sqrt{t}$, the lines $x = 1$ and $x = 9$, and the x-axis. $\boxed{\frac{56}{3}}$

   (b) Find also the volume of solid generated when R is rotated through 360° about the x-axis. $\boxed{\frac{136\pi}{3}}$

6. Sketch the curve, C, with parametric equations $x = 4t, y = \frac{2}{t^2}$. The region R is bounded by C, the lines $x = 2$ and $x = 4$ and the x-axis.

   (a) Find the area of the finite region R. $\boxed{8}$

   (b) Find also the volume of solid generated when R is rotated through 360° about the x-axis. $\boxed{\frac{112\pi}{3}}$