Example 1: Find the average value of $\sin(x)$ over $(0, \frac{\pi}{4})$

$$\frac{1}{\frac{\pi}{4}} \int_0^{\frac{\pi}{4}} \sin(x)dx$$
$$\frac{4}{\pi}(-\cos(x))\Big|_0^{\frac{\pi}{4}}$$
$$\frac{4}{\pi}\left(\frac{-\sqrt{2}}{2}+1\right)$$
$$\frac{2-2\sqrt{2}}{2\pi}$$

Example 2: Find the average value of $x^3 - 2x + 1$ over $(5, 9)$

$$\frac{1}{9-5} \int_5^9 x^3 - 2x + 1dx$$
$$\frac{1}{4}\left(\frac{1}{4}x^4 - x^2 + x\right)\Big|_5^9$$
$$\frac{1}{4}(1568.25 - 136.25)$$
$$358$$