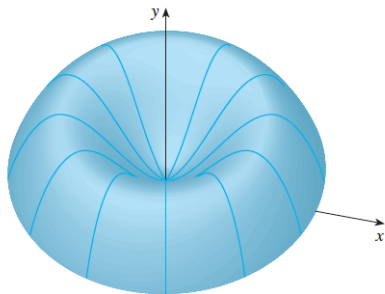
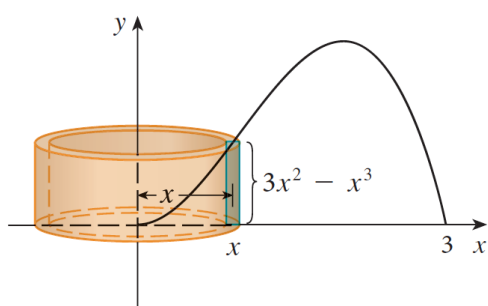
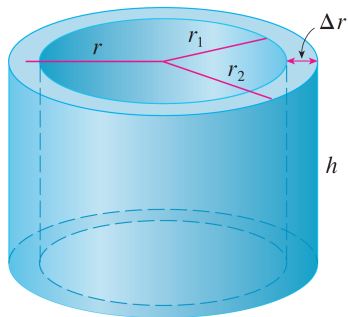


§6.3 Volumes by Cylindrical Shells

Example 1. Region is closed by $y = 3x^2 - x^3$ and $y = 0$.

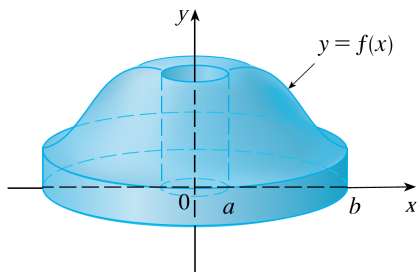
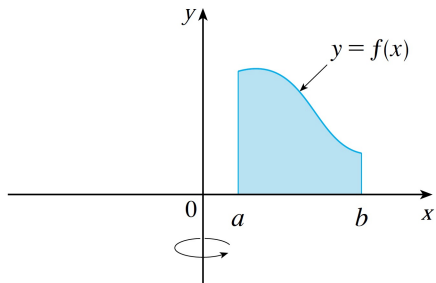


§6.3 Volumes by Cylindrical Shells

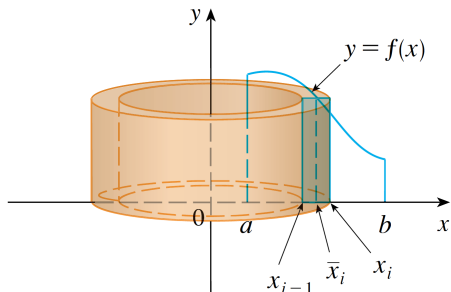


$$V = 2\pi r h \Delta r$$

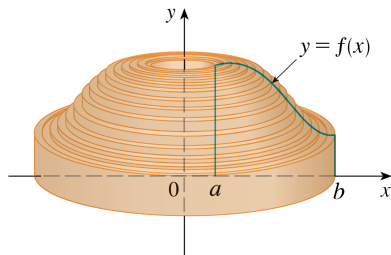
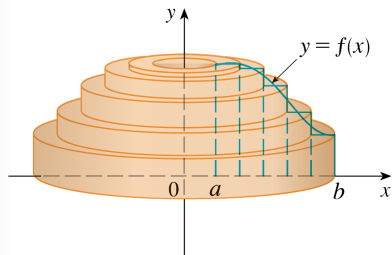
§6.3 Volumes by Cylindrical Shells



§6.3 Volumes by Cylindrical Shells



$$V \approx \sum_{i=1}^n 2\pi x_i^* f(x_i^*) \Delta x.$$



§6.3 Volumes by Cylindrical Shells

The volume of the solid S obtained by rotating about the y -axis the region R under the curve $y = f(x)$ from a to b , is

$$V = \lim_{n \rightarrow \infty} \sum_{i=1}^n 2\pi x_i^* f(x_i^*) \Delta x.$$

Hence, using the definition of definite integral

Definition (Volume by Cylindrical Shells)

$$V = \int_a^b 2\pi x f(x) dx$$