

## Solutions

---

Each answer shows the steps, then the **result**.

### 2.1

- $\int_0^3 x^2 dx$

### 2.2

- $A = (2x)^2 = 4x^2; \int_0^2 4x^2 dx = \left[\frac{4x^3}{3}\right]_0^2 = \frac{32}{3}$

### 2.3

- $\int_0^1 (1-x)^2 dx = \left[-\frac{(1-x)^3}{3}\right]_0^1 = 0 - \left(-\frac{1}{3}\right) = \frac{1}{3}$

### 3.1 B

- integrate the cross-sectional area

### 3.2

(a)

- $s = 4 - x^2$

(b)

- $\int_{-2}^2 (4 - x^2)^2 dx$

### 3.3

- $s = x - x^2$  on  $[0, 1]$ ;  $V = \int_0^1 (x - x^2)^2 dx = \int_0^1 (x^2 - 2x^3 + x^4) dx = \left[\frac{x^3}{3} - \frac{x^4}{2} + \frac{x^5}{5}\right]_0^1$   
 $= \frac{1}{3} - \frac{1}{2} + \frac{1}{5} = \frac{1}{30}$