Solutions

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

2.1

- $x^3 - 4x = x(x^2 - 4) = 0 \Rightarrow x = 0, \pm 2$

2.2

- $4x = 4$ vs $x^3 = 1$ at $x = 1$, so $y = 4x$ is greater

2.3

- $\left[2x^2 - \frac{x^4}{4}\right]_0^2 = 8 - 4 = 4$

3.1 B

- split at the crossings, using the correct upper curve on each piece

3.2

(a)

- $x^3 = 4x \Rightarrow x = -2, 0, 2$

(b)

- On $(0, 2)$ top is $4x$, area $\int_0^2 (4x - x^3)\,dx = 4$; by symmetry the region on $(-2, 0)$ has equal area 4; total $= 8$

3.3

- The integral is 0 because the region below the axis (negative signed area) cancels the region above; the true area is $\displaystyle\int_{-1}^{0} (x^3 - x)\,dx + \left|\int_{0}^{1} (x^3 - x)\,dx\right|$, i.e. split at $x = 0$ and add the absolute areas