Areas

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Find the area between $y = x^2$ and $y = 2x$. [2 marks]

The intersections are 0 and 2.

Integrate $2x - x^2$ over that interval.

Answer: $\frac{4}{3}$ square units

2. Find the area under $y = 4 - x^2$ above the x axis. [2 marks]

Zeros are -2 and 2.

Integrate $4 - x^2$ between them.

Answer: $\frac{32}{3}$ square units

3. Find the area between $y = |x|$ and the axis on $[-1, 1]$. [2 marks]

Use two congruent right triangles.

Each has area $\frac{1}{2}$.

Answer: 1 square unit

4. Find the area between $y = x$ and $y = \sin x$ on $[0, \pi]$. [2 marks]

x is at least $\sin x$ throughout this interval.

Integrate $x - \sin x$ and evaluate endpoints.

Answer: $\frac{\pi^2}{2} - 2$ square units

5. Find area between $x = y^2$ and $x = 4$ for $0 \le y \le 2$. [2 marks]

Horizontal slices have width $4 - y^2$.

Integrate from $y = 0$ to 2.

Answer: $\frac{16}{3}$ square units

6. A student reports area zero between $y = x^3$ and the x axis on $[-1, 1]$. Correct the result. [2 marks]

The signed integral is zero, but areas add.

Use twice the integral of x^3 from 0 to 1.

Answer: $\frac{1}{2}$ square unit