

Core 2 Integration Questions (From the Oxford MAT Tests)

For answers, see [the MAT website](#)

Specimen A, Question 1a:

A. The area of the region bounded by the curves $y = x^2$ and $y = x + 2$ equals

- (a) $\frac{7}{3}$ (b) $\frac{7}{2}$ (c) $\frac{9}{2}$ (d) $\frac{11}{2}$
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2007, Question 1h:

H. Given a function $f(x)$, you are told that

$$\int_0^1 3f(x) \, dx + \int_1^2 2f(x) \, dx = 7,$$
$$\int_0^2 f(x) \, dx + \int_1^2 f(x) \, dx = 1.$$

It follows that $\int_0^2 f(x) \, dx$ equals

- (a) -1 , (b) 0 , (c) $\frac{1}{2}$, (d) 2 .
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2009, Question 1a:

A. The smallest value of

$$I(a) = \int_0^1 (x^2 - a)^2 \, dx,$$

as a varies, is

- (a) $\frac{3}{20}$, (b) $\frac{4}{45}$, (c) $\frac{7}{13}$, (d) 1 .
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2010, Question 1i:

I. For a positive number a , let

$$I(a) = \int_0^a (4 - 2^{x^2}) \, dx.$$

Then $dI/da = 0$ when a equals

(a) $\frac{1 + \sqrt{5}}{2}$, (b) $\sqrt{2}$, (c) $\frac{\sqrt{5} - 1}{2}$, (d) 1.

2012, Question 1h:

H. In the region $0 < x \leq 2\pi$, the equation

$$\int_0^x \sin(\sin t) \, dt = 0$$

has

(a) no solution; (b) one solution; (c) two solutions; (d) three solutions.

2013, Question 1h:

H. The area bounded by the graphs

$$y = \sqrt{2 - x^2} \quad \text{and} \quad x + (\sqrt{2} - 1)y = \sqrt{2}$$

equals

(a) $\frac{\sin \sqrt{2}}{\sqrt{2}}$; (b) $\frac{\pi}{4} - \frac{1}{\sqrt{2}}$; (c) $\frac{\pi}{2\sqrt{2}}$; (d) $\frac{\pi^2}{6}$.
