

# solving differential equations

[SQA] 1. The graph of  $y = g(x)$  passes through the point  $(1, 2)$ .

If  $\frac{dy}{dx} = x^3 + \frac{1}{x^2} - \frac{1}{4}$ , express  $y$  in terms of  $x$ .

4

Part	Marks	Level	Calc.	Content	Answer	U2 OC2
	4	C	NC	C18		1999 P1 Q11

- <sup>1</sup>  $x^{-2}$  stated or implied by •<sup>2</sup> or •<sup>3</sup>
- <sup>2</sup>  $y = \int (x^3 + x^{-2} - \frac{1}{4}) dx$  or the appearance of any term of  $\frac{1}{4}x^4 - \frac{1}{4}x - x^{-1}$
- <sup>3</sup> the remaining two terms
- <sup>4</sup>  $c = 3$

[SQA] 2. For all points on the curve  $y = f(x)$ ,  $f'(x) = 1 - 2x$ .

If the curve passes through the point  $(2, 1)$ , find the equation of the curve.

4

Part	Marks	Level	Calc.	Content	Answer	U2 OC2
	3	C	NC	C18		1990 P1 Q8

- <sup>1</sup>  $\int (1 - 2x) dx = \dots$
- <sup>2</sup>  $x - x^2$
- <sup>3</sup>  $+c$
- <sup>4</sup>  $c = 3$

[SQA] 3. A curve with equation  $y = f(x)$  passes through the point  $(2, -1)$  and is such that  $f'(x) = 4x^3 - 1$ .

Express  $f(x)$  in terms of  $x$ .

5

Part	Marks	Level	Calc.	Content	Answer	U2 OC2
	5	C	NC	C18		1991 P1 Q10

- <sup>1</sup>  $\int (4x^3 - 1) dx = \dots$
- <sup>2</sup>  $x^4 - x$
- <sup>3</sup>  $+c$
- <sup>4</sup>  $f(2) = 14 + c$
- <sup>5</sup>  $c = -15$

[SQA] 4. A curve for which  $\frac{dy}{dx} = 3x^2 + 1$  passes through the point  $(-1, 2)$ .

Express  $y$  in terms of  $x$ .

4

Part	Marks	Level	Calc.	Content	Answer	U2 OC2
	4	C	NC	C18		1992 P1 Q4

- <sup>1</sup>  $\int (3x^2 + 1) dx$
- <sup>2</sup>  $x^3 + x$
- <sup>3</sup>  $+c$
- <sup>4</sup>  $y = x^3 + x + 4$

[SQA] 5. A curve for which  $\frac{dy}{dx} = 6x^2 - 2x$  passes through the point  $(-1, 2)$ .

Express  $y$  in terms of  $x$ .

3

Part	Marks	Level	Calc.	Content	Answer	U2 OC2
	3	C	NC	C18		1998 P1 Q10

- <sup>1</sup>  $y = 2x^3 - x^2$
- <sup>2</sup>  $y = 2x^3 - x^2 + k$  and substituting
- <sup>3</sup>  $k = 5$

[SQA] 6. The graph of  $y = f(x)$  passes through the point  $(\frac{\pi}{9}, 1)$ .

If  $f'(x) = \sin(3x)$  express  $y$  in terms of  $x$ .

4

Part	Marks	Level	Calc.	Content	Answer	U3 OC2
	4	A/B	NC	C18, C23	$y = -\frac{1}{3} \cos(3x) + \frac{7}{6}$	2000 P1 Q8

- <sup>1</sup> ss: know to integrate
- <sup>2</sup> pd: integrate
- <sup>3</sup> ic: interpret  $(\frac{\pi}{9}, 1)$
- <sup>4</sup> pd: process

- <sup>1</sup>  $y = \int \sin(3x) dx$  stated or implied by
- <sup>2</sup>  $-\frac{1}{3} \cos(3x)$
- <sup>3</sup>  $1 = -\frac{1}{3} \cos(\frac{3\pi}{9}) + c$  or equiv.
- <sup>4</sup>  $c = \frac{7}{6}$

[SQA] 7. A curve for which  $\frac{dy}{dx} = 3 \sin(2x)$  passes through the point  $\left(\frac{5\pi}{12}, \sqrt{3}\right)$ .

Find  $y$  in terms of  $x$ .

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Part	Marks	Level	Calc.	Content	Answer	U3 OC2
	4	A/B	CN	C18, C23	$y = -\frac{3}{2} \cos(2x) + \frac{1}{4}\sqrt{3}$	2001 P2 Q10
<ul style="list-style-type: none"> <li>•<sup>1</sup> pd: integrate trig function</li> <li>•<sup>2</sup> pd: integrate composite function</li> <li>•<sup>3</sup> ss: use given point to find "c"</li> <li>•<sup>4</sup> pd: evaluate "c"</li> </ul>					<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\int 3 \sin(2x) dx</math> stated or implied by •<sup>2</sup></li> <li>•<sup>2</sup> <math>-\frac{3}{2} \cos(2x)</math></li> <li>•<sup>3</sup> <math>\sqrt{3} = -\frac{3}{2} \cos\left(2 \times \frac{5}{12}\pi\right) + c</math></li> <li>•<sup>4</sup> <math>c = \frac{1}{4}\sqrt{3} (\approx 0.4)</math></li> </ul>	

[END OF QUESTIONS]