Paper Reference(s)

6665/01

Edexcel GCE

Core Mathematics C3
Silver Level S1

Time: 1 hour 30 minutes

Materials required for examination papers	**Items included with question**
Mathematical Formulae (Green)	Nil

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulas stored in them.

Instructions to Candidates

Write the name of the examining body (Edexcel), your centre number, candidate number, the unit title (Core Mathematics C3), the paper reference (6665), your surname, initials and signature.

Information for Candidates

A booklet 'Mathematical Formulae and Statistical Tables' is provided.
Full marks may be obtained for answers to ALL questions.
There are 8 questions in this question paper. The total mark for this paper is 75.

Advice to Candidates

You must ensure that your answers to parts of questions are clearly labelled.
You must show sufficient working to make your methods clear to the Examiner. Answers without working may gain no credit.

Suggested grade boundaries for this paper:

A*	A	B	C	D	E
72	65	58	51	46	39

1. Differentiate with respect to x, giving your answer in its simplest form,

(a) $x^2 \ln (3x)$,

(4)

(b) $\dfrac{\sin 4x}{x^3}$.

(5)

January 2012

2.

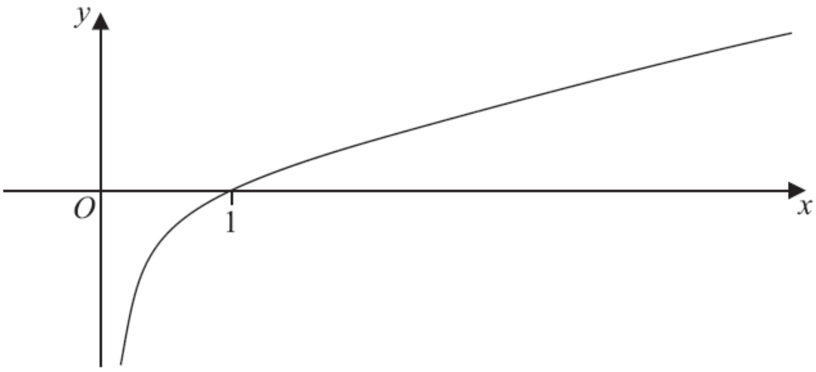

Figure 1

Figure 1 shows a sketch of the curve with equation $y = \mathrm{f}(x)$, $x > 0$, where f is an increasing function of x. The curve crosses the x-axis at the point (1, 0) and the line $x = 0$ is an asymptote to the curve.

On separate diagrams, sketch the curve with equation

(a) $y = \mathrm{f}(2x)$, $x > 0$

(2)

(b) $y = |\mathrm{f}(x)|$, $x > 0$

(3)

Indicate clearly on each sketch the coordinates of the point at which the curve crosses or meets the x-axis.

June 2013 (R)

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3. The area, A mm^2, of a bacterial culture growing in milk, t hours after midday, is given by

$$A = 20e^{1.5t}, \qquad t \geq 0.$$

(a) Write down the area of the culture at midday.

(1)

(b) Find the time at which the area of the culture is twice its area at midday. Give your answer to the nearest minute.

(5)

January 2012

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4. $$f(x) = -x^3 + 3x^2 - 1.$$

(a) Show that the equation $f(x) = 0$ can be rewritten as

$$x = \sqrt{\left(\frac{1}{3-x}\right)}.$$

(2)

(b) Starting with $x_1 = 0.6$, use the iteration

$$x_{n+1} = \sqrt{\left(\frac{1}{3-x_n}\right)}$$

to calculate the values of x_2, x_3 and x_4, giving all your answers to 4 decimal places.

(2)

(c) Show that $x = 0.653$ is a root of $f(x) = 0$ correct to 3 decimal places.

(3)

June 2007

5.

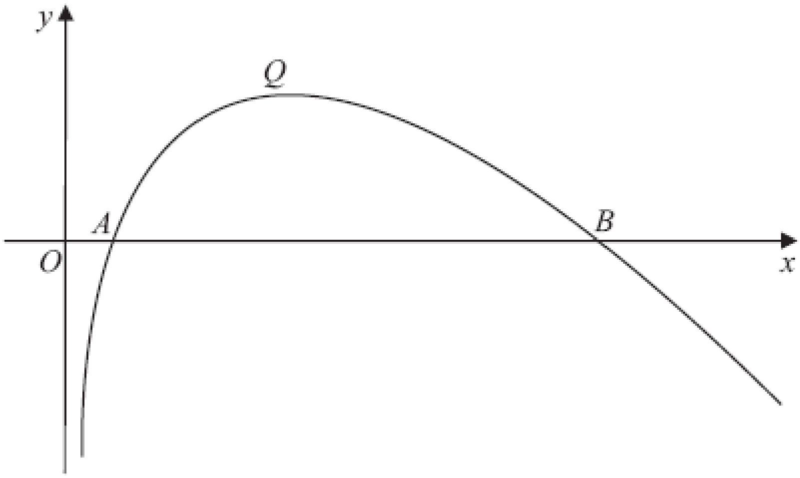

Figure 2

Figure 2 shows a sketch of part of the curve with equation $y = \mathrm{f}(x)$, where

$$\mathrm{f}(x) = (8 - x)\ln x, \qquad x > 0.$$

The curve cuts the x-axis at the points A and B and has a maximum turning point at Q, as shown in Figure 2.

(*a*) Write down the coordinates of A and the coordinates of B.

(2)

(*b*) Find $\mathrm{f}'(x)$.

(3)

(*c*) Show that the x-coordinate of Q lies between 3.5 and 3.6

(2)

(*d*) Show that the x-coordinate of Q is the solution of

$$x = \frac{8}{1 + \ln x}.$$

(3)

To find an approximation for the x-coordinate of Q, the iteration formula

$$x_{n+1} = \frac{8}{1 + \ln x_n}$$

is used.

(*e*) Taking $x_0 = 3.55$, find the values of x_1, x_2 and x_3.
Give your answers to 3 decimal places.

(3)

January 2011

6. (*a*) Use the identity $\cos(A + B) = \cos A \cos B - \sin A \sin B$, to show that

$$\cos 2A = 1 - 2\sin^2 A$$

(2)

The curves C_1 and C_2 have equations

$$C_1: y = 3\sin 2x$$
$$C_2: y = 4\sin^2 x - 2\cos 2x$$

(*b*) Show that the x-coordinates of the points where C_1 and C_2 intersect satisfy the equation

$$4\cos 2x + 3\sin 2x = 2$$

(3)

(*c*) Express $4\cos 2x + 3\sin 2x$ in the form $R\cos(2x - \alpha)$, where $R > 0$ and $0 < \alpha < 90°$, giving the value of α to 2 decimal places.

(3)

(*d*) Hence find, for $0 \le x < 180°$, all the solutions of

$$4\cos 2x + 3\sin 2x = 2,$$

giving your answers to 1 decimal place.

(4)

June 2009

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7. The function f is defined by

$$\mathrm{f}(x) = 1 - \frac{2}{(x+4)} + \frac{x-8}{(x-2)(x+4)}, \quad x \in \mathbb{R},\ x \neq -4,\ x \neq 2.$$

(*a*) Show that $\mathrm{f}(x) = \dfrac{x-3}{x-2}$.

(5)

The function g is defined by

$$\mathrm{g}(x) = \frac{\mathrm{e}^x - 3}{\mathrm{e}^x - 2}, \quad x \in \mathbb{R},\ x \neq \ln 2.$$

(*b*) Differentiate $\mathrm{g}(x)$ to show that $\mathrm{g}'(x) = \dfrac{\mathrm{e}^x}{(\mathrm{e}^x - 2)^2}$.

(3)

(*c*) Find the exact values of x for which $\mathrm{g}'(x) = 1$

(4)

June 2009

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8. $$f(x) = 3xe^x - 1.$$

The curve with equation $y = f(x)$ has a turning point P.

(a) Find the exact coordinates of P.

(5)

The equation $f(x) = 0$ has a root between $x = 0.25$ and $x = 0.3$.

(b) Use the iterative formula

$$x_{n+1} = \frac{1}{3}e^{-x_n}.$$

with $x_0 = 0.25$ to find, to 4 decimal places, the values of x_1, x_2 and x_3.

(3)

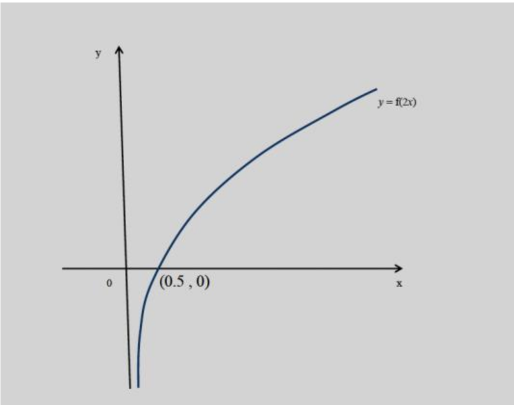
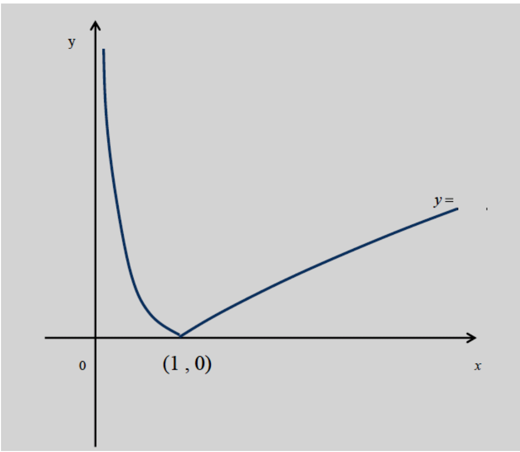
(c) By choosing a suitable interval, show that a root of $f(x) = 0$ is $x = 0.2576$ correct to 4 decimal places.

(3)

January 2009

TOTAL FOR PAPER: 75 MARKS

END

Question Number	Scheme	Marks
1. (a)	$\frac{d}{dx(\ln(3x))} \to \frac{B}{x}$ for any constant B	M1
	Applying $vu' + uv'$, $\ln(3x) \times 2x + x$	M1 A1
		A1
		(4)
(b)	Applying $\frac{vu' - uv'}{v^2}$	M1
	$\frac{x^3 \times 4cos(4x) - \sin(4x) \times 3x^2}{x^6}$	A1+A1
		A1
	$= \frac{4xcos(4x) - 3\sin(4x)}{x^4}$	A1 (5)
		[9]
2. (a)	 Shape	B1
	(0.5, 0)	B1
		(2)
(b)	 Shape	B1
	(1,0)	B1
	Cusp at (1,0)	B1
		(3)
		[5]

Question Number	Scheme	Marks
3. (a)	20 (mm^2)	B1 (1)
(b)	$'40' = 20\ e^{1.5t} \rightarrow e^{1.5t} = c$	M1
	$e^{1.5t} = \frac{40}{20} = (2)$	A1
	Correct order $1.5t = \ln' 2' \rightarrow t = \frac{\ln c}{1.5}$	M1
	$t = \frac{\ln 2}{1.5} = (\text{awrt } 0.46)$	A1
	12.28 or 28 (minutes}	A1 (5)
		[6]
4. (a)	$x^2(3 - x) - 1 = 0$ o.e. (e.g. $x^2(-x + 3) = 1$)	M1
	$x = \sqrt{\frac{1}{3-x}}$ (✱)	A1 (cso) (2)
	Note(✱), answer is given: need to see appropriate working and A1 is cso [Reverse process: Squaring and non-fractional equation M1, form f(x) A1]	
(b)	$x_2 = 0.6455$, $x_3 = 0.6517$, $x_4 = 0.6526$ 1st B1 is for one correct, 2nd B1 for other two correct If all three are to greater accuracy, award B0 B1	B1; B1 (2)
(c)	Choose values in interval (0.6525, 0.6535) or tighter and evaluate both f(0.6525) = –0.0005 (372… f(0.6535) = 0.002 (101… At least one correct "up to bracket", i.e. -0.0005 or 0.002 **Change of sign,** $\therefore$ $x = 0.653$ is a root (correct) to 3 d.p. Requires both correct "up to bracket" and conclusion as above	M1 A1 A1 (3)
		[7]

Question Number	Scheme		Marks
5. (a)	Crosses x-axis $\Rightarrow \mathrm{f}(x)=0 \Rightarrow (8-x)\ln x = 0$		
	Either $(8-x)=0$ or $\ln x = 0 \Rightarrow x = 8, 1$	Either one of {x}=1 OR x={8}	B1
	Coordinates are $A(1, 0)$ and $B(8, 0)$.	Both $A(1, \{0\})$ and $B(8, \{0\})$	B1 (2)
(b)	Apply product rule: $\begin{Bmatrix} u = (8-x) & v = \ln x \\ \dfrac{\mathrm{d}u}{\mathrm{d}x} = -1 & \dfrac{\mathrm{d}v}{\mathrm{d}x} = \dfrac{1}{x} \end{Bmatrix}$	$vu' + uv'$	M1
	$\mathrm{f}'(x) = -\ln x + \dfrac{8-x}{x}$	Any one term correct	A1
		Both terms correct	A1 (3)
(c)	$\mathrm{f}'(3.5) = 0.032951317...$ $\mathrm{f}'(3.6) = -0.058711623...$ Sign change (and as $\mathrm{f}'(x)$ is continuous) therefore the x-coordinate of Q lies between 3.5 and 3.6.	Attempts to evaluate **both** $\mathrm{f}'(3.5)$ and $\mathrm{f}'(3.6)$	M1
		both values correct to at least 1 sf, sign change and conclusion	A1 (2)
(d)	At Q, $\mathrm{f}'(x) = 0 \Rightarrow -\ln x + \dfrac{8-x}{x} = 0$	Setting $\mathrm{f}'(x) = 0$.	M1
	$\Rightarrow -\ln x + \dfrac{8}{x} - 1 = 0$	Splitting up the numerator and proceeding to x=	M1
	$\Rightarrow \dfrac{8}{x} = \ln x + 1 \Rightarrow 8 = x(\ln x + 1)$		
	$\Rightarrow x = \dfrac{8}{\ln x + 1}$ (as required)	For correct proof. No errors seen in working.	A1 (3)

Question Number	Scheme		Marks
(e)	Iterative formula: $x_{n+1} = \dfrac{8}{\ln x_n + 1}$		
	$x_1 = \dfrac{8}{\ln(3.55) + 1}$	An attempt to substitute $x_0 = 3.55$ into the iterative formula. Can be implied by $x_1 = 3.528(97)...$	M1
	$x_1 = 3.528974374...$ $x_2 = 3.538246011...$ $x_3 = 3.534144722...$	Both $x_1 =$ awrt 3.529 and $x_2 =$ awrt 3.538	A1
	$x_1 = 3.529,\ x_2 = 3.538,\ x_3 = 3.534,$ to 3 dp.	x_1 , x_2 , x_3 all stated correctly to 3 dp	A1
			(3) **[13]**

Question Number	Scheme	Marks
6. (a)	$A=B \Rightarrow \cos(A+A) = \cos 2A = \underline{\cos A\cos A - \sin A\sin A}$	M1
	$\cos 2A = \cos^2 A - \sin^2 A$ and $\cos^2 A + \sin^2 A = 1$ gives	
	$\underline{\cos 2A} = 1 - \sin^2 A - \sin^2 A = \underline{1 - 2\sin^2 A}$ (as required)	A1 (2)
(b)	$C_1 = C_2 \Rightarrow 3\sin 2x = 4\sin^2 x - 2\cos 2x$	M1
	$3\sin 2x = 4\left(\frac{1-\cos 2x}{2}\right) - 2\cos 2x$	M1
	$3\sin 2x = 2(1-\cos 2x) - 2\cos 2x$	
	$3\sin 2x = 2 - 2\cos 2x - 2\cos 2x$	
	$3\sin 2x + 4\cos 2x = 2$	A1 (3)
(c)	$3\sin 2x + 4\cos 2x = R\cos(2x-\alpha)$	
	$3\sin 2x + 4\cos 2x = R\cos 2x\cos\alpha + R\sin 2x\sin\alpha$	
	Equate $\sin 2x$: $3 = R\sin\alpha$ Equate $\cos 2x$: $4 = R\cos\alpha$	
	$R = \sqrt{3^2+4^2}$;$= \sqrt{25} = 5$	B1
	$\tan\alpha = \frac{3}{4} \Rightarrow \alpha = 36.86989765...^\circ$	M1 A1
	Hence, $3\sin 2x + 4\cos 2x = 5\cos(2x - 36.87)$	A1 (3)
(d)	$3\sin 2x + 4\cos 2x = 2$	
	$5\cos(2x-36.87) = 2$	
	$\cos(2x-36.87) = \frac{2}{5}$	M1
	$(2x-36.87) = 66.42182...^\circ$	A1
	$(2x-36.87) = 360 - 66.42182...^\circ$	
	Hence, $x = 51.64591...^\circ,\ 165.22409...^\circ$	A1 A1 (4)
		[12]

Question Number	Scheme	Marks
7. (a)	$\mathrm{f}(x) = 1 - \dfrac{2}{(x+4)} + \dfrac{x-8}{(x-2)(x+4)} \qquad x \in \mathbb{R},\ x \neq -4,\ x \neq 2.$	
	$\mathrm{f}(x) = \dfrac{(x-2)(x+4) - 2(x-2) + x - 8}{(x-2)(x+4)}$	M1 A1
	$= \dfrac{x^2 + 2x - 8 - 2x + 4 + x - 8}{(x-2)(x+4)}$	
	$= \dfrac{x^2 + x - 12}{[(x+4)(x-2)]}$	A1
	$= \dfrac{(x+4)(x-3)}{[(x+4)(x-2)]}$	M1
	$= \dfrac{(x-3)}{(x-2)}$	A1 cso (5)
(b)	$\mathrm{g}(x) = \dfrac{e^x - 3}{e^x - 2} \qquad x \in \mathbb{R},\ x \neq \ln 2.$	
	Apply quotient rule: $\left\{ \begin{array}{ll} u = e^x - 3 & v = e^x - 2 \\ \dfrac{du}{dx} = e^x & \dfrac{dv}{dx} = e^x \end{array} \right\}$	
	$\mathrm{g}'(x) = \dfrac{e^x(e^x - 2) - e^x(e^x - 3)}{(e^x - 2)^2}$	M1 A1
	$= \dfrac{e^x}{(e^x - 2)^2}$	A1 cso (3)
(c)	$\mathrm{g}'(x) = 1 \Rightarrow \dfrac{e^x}{(e^x - 2)^2} = 1$	
	$e^x = (e^x - 2)^2$	M1
	$e^x = e^{2x} - 2e^x - 2e^x + 4$	
	$\underline{e^{2x} - 5e^x + 4} = 0$	A1
	$(e^x - 4)(e^x - 1) = 0$	M1
	$e^x = 4$ or $e^x = 1$	
	$x = \ln 4$ or $x = 0$	A1 (4)
		[12]

Question Number	Scheme	Marks
8. (a)	$f'(x) = 3e^x + 3xe^x$	M1 A1
	$3e^x + 3xe^x = 3e^x(1+x) = 0$	
	$x = -1$	M1 A1
	$f(-1) = -3e^{-1} - 1$	B1 (5)
(b)	$x_1 = 0.2596$	B1
	$x_2 = 0.2571$	B1
	$x_3 = 0.2578$	B1 (3)
(c)	Choosing $(0.257\,55, 0.257\,65)$ or an appropriate tighter interval.	M1
	$f(0.257\,55) = -0.000\,379\ ...$	
	$f(0.257\,65) = 0.000\,109\ \ldots$	A1
	Change of sign (and continuity) $\Rightarrow$ root $\in (0.257\,55, 0.257\,65)$ ∗ cso	A1
	($\Rightarrow x = 0.2576$, is correct to 4 decimal places)	(3)
		[11]
	Note: $x = 0.257\,627\,65\ \ldots$ is accurate	

Examiner reports

Question 1

The question was answered very well, with many candidates scoring full marks. It seems that most candidates have followed previously given advice and are now writing down the product and quotient rules before attempting to use them. Failure to do this followed by incorrect expressions risks the loss of many marks in such questions.

Part (a) got candidates off to a positive start, although a common mistake was to differentiate ln (3*x*) to get $\frac{1}{3x}$ instead of $\frac{1}{x}$. Also some candidates did not simplify their answer and left it as $2x\ln(3x)+\frac{x^2}{x}$ or even $2x\ln(3x)+\frac{3x^2}{3x}$.

Part (b) was equally encouraging with errors being seen on sin 4*x* differentiating to just cos 4*x*. Worryingly however a large number of candidates simplified the denominator of $(x^3)^2$ to x^5.

Additionally some candidates failed to simplify their answer leaving as $\frac{x^2\left(4x\cos(4x)-3\sin(4x)\right)}{x^6}$

Question 2

This question was very well attempted by candidates, with some graph sketching of a high standard. In almost all cases a correct shape was seen for part (a), with a few mislabels on the *x*-axis (usually (2,0)). Occasional errors seen in part (b) included sketching f(|*x*|) and f(–*x*) rather than |f(*x*)|, and drawing a "minimum" rather than a cusp.

Question 3

The responses to this question were generally excellent with many candidates again scoring full marks.

A = 20 at t = 0 was almost always gained in part (a) although occasionally $20e^{1.5\times 12}$ was calculated. Having gained the mark in (a) a great majority were able to obtain a correct exponential equation and take ln correctly to give t = 0.46 or equivalent, although not all realised that this figure represented hours rather than minutes, thereby losing the final mark for not converting to minutes. There were a few instances where $\frac{40}{20}$ was found to be 20, rather than 2, leading to the loss of accuracy marks. A few candidates attempted trial and improvement in (b) but usually failed to choose a tight enough interval to span the correct value.

Question 4

Most candidates are well versed in this type of question and this was another good source of marks for many candidates. There were some "fiddles" in part (a), as this was a given result, but generally this was well done. Part (b) was an easy two marks for using a calculator correctly, and the majority of candidates gained these; not giving answers to the required 4 decimal places did lose a mark, however.

In part (c) the majority of candidates chose an acceptable method, but it was quite common to see marks lost in either not giving a clear conclusion or in loss of accuracy in calculations.

Question 5

Question 5 proved to be a useful source of marks for all candidates. Grade A candidates scored almost all marks and E grade candidates picked up at least 5 marks. Part (a) proved a positive start to the question for nearly all candidates with most writing down both correct x-coordinates although a few did struggle in solving $\ln x = 1$. "Write down" should have been a hint that no real calculation was required.

In part (b) apart from a few who confused the notation with the inverse function most realised the need to use the product rule and proceeded correctly. The majority of good candidates scored full marks in this part. Candidates should still be advised to quote formulae before they are used.

While some candidates in part (c) mistakenly used $f(x)$ instead of $f'(x)$, most successfully substituted both 3.5 and 3.6 into their derivative and knew to look for a sign change. There were a multitude of wordings applied to the significance of this – "hence root" being the most common − and candidates would be advised to read the text of the question in order to set their conclusion in the right context. There were, however, some excellent answers where candidate clearly understood the question and in some cases added diagrams to illustrate their point.

A significant number of candidates omitted part (d) altogether or tried a variation on (c). Those who realised that they had to equate the derivative to zero usually gained full marks. Trying to work backwards from the answer rarely proved a good idea with candidates unsure of how far they needed to go with their solution. The neatest solutions often resulted in continuing from a simplified version of the derivative they had found earlier.

Part (e), this as with (a) proved a good source of marks even where there was little gained in other parts of the question. Often just the correct values appeared and it was good to note that virtually all complied with the question and gave all 3 answers to 3 decimal places.

Question 6

The majority of candidates were able to give a correct proof in part (a). A number of candidates having written $\cos 2A = \cos^2 A - \sin^2 A$ did not make the connection with $\sin^2 A + \cos^2 A = 1$ and were unable to arrive at the given result.

Part (b) proved to be one of the most challenging parts of the paper with many candidates just gaining the first mark for this part by eliminating y correctly. A number of candidates spotted the link with part (a) and either substituted $\dfrac{1-\cos 2x}{2}$ for $\sin^2 x$ or $1-\cos 2x$ for $2\sin^2 x$ and usually completed the proof in a few lines. A significant number of candidates manipulated $4\sin^2 x - 2\cos 2x$ to $8\sin^2 x - 2$ and usually failed to progress further. There were some candidates who arrived at the correct result usually after a few attempts or via a tortuous route.

Part (c) was well done. R was usually correctly stated by the vast majority of candidates. Some candidates gave α to 1 decimal place instead of the 2 decimal places required in the question. Other candidates incorrectly wrote $\tan\alpha$ as $\frac{4}{3}$. In both cases, such candidates lost the final accuracy mark for this part. There was some confusion between $2x$ and α, leading to some candidates writing $\tan 2x$ as $\frac{3}{4}$ and thereby losing the two marks for finding α.

Many candidates who were successful in part (c) were usually able to make progress with part (d) and used a correct method to find the first angle. A number of candidates struggled to apply a correct method in order to find their second angle. A significant number of candidates lost the final accuracy mark owing to incorrect rounding errors with either one or both of 51.7° or 165.3° seen without a more accurate value given first.

Question 7

Many candidates were able to obtain the correct answer in part (a) with a significant number of candidates making more than one attempt to arrive at the answer given in the question. Those candidates who attempted to combine all three terms at once or those who combined the first two terms and then combined the result with the third term were more successful in this part. Other candidates who started by trying to combine the second and third terms had problems dealing with the negative sign in front of $\frac{2}{x+4}$ and usually added $\frac{2}{(x+4)}$ to $\frac{x-8}{(x-2)(x+4)}$ before combining the result with 1. It was pleasing to see that very few candidates used $(x+4)^2(x-2)$ as their common denominator when combining all three terms.

In part (b), most candidates were able to apply the quotient rule correctly but a number of candidates failed to use brackets properly in the numerator and then found some difficultly in arriving at the given answer.

In part (c), many candidates were able to equate the numerator to the denominator of the given fraction and many of these candidates went onto form a quadratic in e^x which they usually solved. A significant number of candidates either failed to spot the quadratic or expanded $(\mathrm{e}^x - 2)^2$ and then took the natural logarithm of each term on both sides of their resulting equation.

In either or both of parts (b) and (c), some candidates wrote e^{x^2} in their working instead of e^{2x}. Such candidates usually lost the final accuracy mark in part (b) and the first accuracy mark in part (c).

Question 8

A substantial proportion of candidates did not recognise that, in part (a), the product rule is needed to differentiate $3x\mathrm{e}^x$ and $3x^2\mathrm{e}^x$, $3x\mathrm{e}^x$ and $3\mathrm{e}^x$ were all commonly seen. It was also not uncommon for the question to be misinterpreted and for $3x\left(\mathrm{e}^x - 1\right)$ to be differentiated. Those who did differentiate correctly usually completed part (a) correctly. Part (b) was very well done with the majority of the candidates gaining full marks. Very few lost marks for truncating their decimals or giving too many decimal places.

In parts (c), candidates need to be aware that showing that something is true requires them to give reasons and conclusions. It would be sufficient to argue that a change of sign in the interval $(0.257\,55, 0.257\,65)$ implies that there is a root in the interval $(0.257\,55, 0.257\,65)$ and, hence, that $x = 0.2576$ is correct to 4 decimal places. The majority of candidates did provide an acceptable argument. Fewer candidates than usual attempted repeated iteration, a method that is explicitly ruled out by the wording of the question.

Statistics for C3 Practice Paper Silver Level S1

Qu	Max score	Modal score	Mean %	Mean score for students achieving grade: ALL	A*	A	B	C	D	E	U
1	9		81	7.25	8.84	8.46	7.84	7.46	6.31	5.91	2.97
2	5		93	4.67	4.90	4.83	4.69	4.63	4.21	4.17	2.95
3	6		88	5.29	5.87	5.69	5.44	5.13	4.69	4.22	2.49
4	7		74	5.17		6.12	5.47	4.90	4.27	3.52	2.41
5	13		74	9.59	12.78	11.87	10.45	8.81	6.84	5.34	3.24
6	12		72	8.69		11.10	9.59	7.82	5.71	3.71	1.69
7	12		78	9.41		11.22	10.12	8.88	7.31	5.51	3.15
8	11		69	7.59		9.88	8.25	7.01	5.50	3.66	2.08
	75		**77**	**57.66**		**69.17**	**61.85**	**54.64**	**44.84**	**36.04**	**20.98**