Question	Answer	Marks	Guidance
1	Use identity $\sec^2\theta = 1 + \tan^2\theta$	**B1**	
	Attempt solution of quadratic equation to find two values of $\tan\theta$	**M1**	
	Obtain $\tan\theta = -\frac{1}{2}$, 3	**A1**	
	Obtain 71.6 and 153.4 and no others between 0 and 180	**A1**	
		4	

Question	Answer	Marks	Guidance
2	Solve non-modular equation $(2x+3)^2 = (2x-1)^2$ or linear equation with signs of $2x$ different	**M1**	
	Obtain $x = -\frac{1}{2}$	**A1**	
	Substitute negative value into expression and show correct evaluation of modulus at least once	**M1**	
	Obtain $5 - 3 = 2$ with no errors seen	**A1**	
		4	

Question	Answer	Marks	Guidance
3	State or imply equation is $\ln y = \ln A + px + p$	**B1**	
	Equate gradient of line to p	**M1**	
	Obtain $p = 0.75$	**A1**	
	Substitute appropriate values to find $\ln A$	**M1**	
	Obtain $\ln A = 1.335...$ and hence $A = 3.8$	**A1**	
		5	

Question	Answer	Marks	Guidance
4(i)	Carry out division at least as far as $2x^2 + kx$	**M1**	
	Obtain quotient $2x^2 + 3x + 4$	**A1**	
	Confirm remainder is 5	**A1**	Answer given; necessary detail needed
		3	
4(ii)	State or imply equation is $(2x+1)(2x^2 + 3x + 4) = 0$	**B1**	FT their quotient from part **(i)**
	Calculate discriminant of 3-term quadratic expression or equivalent	**M1**	
	Obtain –23 or equiv and conclude appropriately	**A1**	
		3	

Question	Answer	Marks	Guidance
5(i)	Attempt rearrangement of $\frac{e^{2x}}{4x+1}=10$ to $x=...$ involving ln	**M1**	
	Confirm $x=\frac{1}{2}\ln(40x+10)$	**A1**	Answer given; necessary detail needed
		2	
5(ii)	Use iteration process correctly at least once	**M1**	
	Obtain final answer 2.316	**A1**	
	Show sufficient iterations to 6 sf to justify answer or show a sign change in the interval [2.3155, 2.3165]	**A1**	
		3	
5(iii)	Use quotient rule (or product rule) to find derivative	**M1**	
	Obtain $\frac{2e^{2x}(4x+1)-4e^{2x}}{(4x+1)^2}$ or equivalent	**A1**	
	Substitute answer from part **(ii)** (or more accurate value) into attempt at first derivative	**M1**	
	Obtain 16.1	**A1**	
		4	

Question	Answer	Marks	Guidance
6(a)	Integrate to obtain form $k_1 \ln x + k_2 \ln(2x+1)$	**M1**	
	Obtain correct $2\ln x + \ln(2x+1)$	**A1**	
	Use logarithm addition/subtraction property correctly	**M1**	
	Use logarithm power property correctly	**M1**	
	Confirm $\ln 48$ with no errors seen	**A1**	Answer given; necessary detail needed
		5	
6(b)	Use identity $\sin 2x = 2\sin x \cos x$	**B1**	
	State or imply $\cot x + 2\operatorname{cosec} x = \dfrac{\cos x}{\sin x} + \dfrac{2}{\sin x}$	**B1**	
	Attempt to express integrand in terms of $\cos 2x$ and $\cos x$	**M1**	
	Obtain correct integrand $1 + \cos 2x + 4\cos x$	**A1**	
	Integrate to obtain at least terms $k_3 \sin 2x$ and $k_4 \sin x$	**M1**	
	Obtain correct $x + \frac{1}{2}\sin 2x + 4\sin x + c$	**A1**	
		6	

Question	Answer	Marks	Guidance
7(i)	Obtain $\frac{dx}{dt} = 2 - 2\cos 2t$	**B1**	
	Obtain $\frac{dy}{dt} = 5 - 2\sin 2t$	**B1**	
	Equate attempt at $\frac{dy}{dx}$ to 2 and rearrange	**M1**	
	Confirm equation $2\sin 2t - 4\cos 2t = 1$	**A1**	Answer given; necessary detail needed
		4	
7(ii)	State $R = \sqrt{20}$ or 4.47	**B1**	
	Use appropriate trigonometry to find α	**M1**	
	Obtain $\alpha = 1.107$ with no errors seen	**A1**	
	Carry out correct method to find value of t	**M1**	
	Obtain $t = 0.666$	**A1**	
	Substitute value of t between 0 and $\frac{1}{2}\pi$ into expressions for x and y	**M1**	
	Obtain $x = 0.361, \quad y = 3.57$	**A1**	
		7	