Question			Answer	Marks	AO	Guidance	
10	**(a)**		Both f(0) and f(1) are positive so no sign change will be seen	**B1**	**2.3**	Identify both *y*-values being positive **and** state 'no sign change' or equiv	Could also evaluate f(0) as 1 and f(1) as 2.9 (or better), and refer to no sign change – these are both positive so no need to include > 0 Could also refer to the asymptote / discontinuity within this range ($x = 0$ to $x = 1$) Also allow 'graph is not continuous in this interval' **B0** for no reference to interval Could say that the two points chosen are not on the same part of the curve
				[1]			
10	**(b)**		$\dfrac{e^x}{4x^2 - 1} = -2$ $e^x = -8x^2 + 2$ $8x^2 = 2 - e^x$	**M1**	**1.1**	Attempt rearrangement, as far as $kx^2 = \ldots$	Allow sign error(s) only
			$16x^2 = 4 - 2e^x$ $4x = \sqrt{4 - 2e^x}$ $x = \dfrac{1}{4}\sqrt{(4 - 2e^x)}$ **A.G.**	**A1**	**1.1**	Obtain given answer convincingly	If $x = \sqrt{\dfrac{1}{4} - \dfrac{1}{8}e^x}$ then an additional line of working needed before given answer (eg show common denominator of 16)
				[2]			

10	(c)		$x_2 = 0.285074813\ldots$	**B1**	**1.1**	Correct first iterate (at least 4sf)	State 0.2851 or better
			0.28943, 0.28817, 0.28853, 0.28843, 0.28846, 0.28845...	**M1**	**1.1**	Correct iterative process (at least 3 more values)	Allow **M1** for 3sf – expect 0.289, 0.288 and then 0.288 or 0.289 depending whether truncating or rounding
			$\alpha = 0.2885$	**A1**	**1.1**	Correct root, given to 4sf, following 2 iterates that agree to 4sf	ie at least 7 iterations needed, given to at least 4sf **A0** for eg $x_8 = 0.2885$ (implies 8th iterate and not root) Process self corrects so **B0M1A1** possible; or **B1M1A1** if error in term other than x_2
				[3]			
10	(d)		$F'(x) = \dfrac{-16x}{2-8x^2}$	**M1**	**1.1a**	Attempt differentiation using the chain rule	Obtain derivative of form $\dfrac{kx}{2-8x^2}$ Condone subscripts still present in derivative
			$F'(0.3) = -3.75$	**M1**	**1.1**	Attempt $F'(0.3)$ – not dependent on previous **M1**, but must follow some attempt at differentiation	**M1** can be implied by correct -3.75 (from correct derivative), but explicit substitution must be seen if $F'(x)$ is incorrect Must come from differentiating $F(x)$ and not a different function

Question	Answer	Marks	AO	Guidance	
	For convergence $\left| F'(\alpha) \right| < 1$, but $-3.75 < -1$, so iteration will not find root	**A1**	**2.5**	Correct reasoning, following correct $F'(0.3)$	Allow $F'(\alpha) < -1$, hence will not converge Condone $F'(x)$ not $F'(\alpha)$
		[3]			No credit for just testing the given iterative formula