

Q	Marking instructions	AO	Marks	Typical solution
10(a)	Uses the product rule with one term correct Condone $vu' - uv'$ or $v'u - u'v$	3.1a	M1	$\frac{dy}{dx} = kx^{k-1} \ln x + x^k \times \frac{1}{x}$
	Obtains $kx^{k-1} \ln x + x^k \times \frac{1}{x}$	1.1b	A1	$\frac{dy}{dx} = kx^{k-1} \ln x + x^{k-1}$
	Simplifies $x^k \times \frac{1}{x} = x^{k-1}$	1.1b	A1	$\frac{dy}{dx} = x^{k-1} [1 + k \ln x]$
	Completes reasoned argument to show $\frac{dy}{dx} = x^{k-1} [1 + k \ln x]$ Argument must include $x^k \times \frac{1}{x}$ or $\frac{x^k}{x}$ before x^{k-1} seen	2.1	R1	
	Subtotal		4	

Q	Marking instructions	AO	Marks	Typical solution
10(b)	Equates the given expression for $\frac{dy}{dx}$ to zero. PI $1 + k \ln x = 0$ and Solves to obtain a non-zero value for x	1.1a	M1	$x^{k-1} [1 + k \ln x] = 0$ $\Rightarrow 1 + k \ln x = 0$ or $x^{k-1} = 0$ $\ln x = -\frac{1}{k}$
	Gives a correct reason for rejecting $x = 0$	2.4	E1	$x = e^{-\frac{1}{k}}$
	Deduces $x = e^{-\frac{1}{k}}$ Accept $x = e^{-\frac{A}{k}}$	2.2a	A1	Since $x > 0$, $x^{k-1} \neq 0$ $y = \left(e^{-\frac{1}{k}}\right)^k \times \ln e^{-\frac{1}{k}}$
	Substitutes their value for x into equation of C.	1.1a	M1	$y = \frac{1}{e} \times \left(-\frac{1}{k}\right)$
	Completes reasoned argument to show the given result. Must see $\left(e^{-\frac{1}{k}}\right)^k$ simplified to e^{-1} or $\frac{1}{e}$ and $\ln e^{-\frac{1}{k}}$ simplified to $-\frac{1}{k}$ before the final answer AG	2.1	R1	$= -\frac{1}{ke}$
	Subtotal		5	

Q	Marking instructions	AO	Marks	Typical solution
10(c)	States 1	1.1b	B1	1
	Subtotal		1	

Q	Marking instructions	AO	Marks	Typical solution
10(d)	Differentiates $\frac{dy}{dx} = x^{k-1} [1 + k \ln x]$ where their $k > 0$ accept $\frac{d^2y}{dx^2}$ in terms of A and/or k	3.1a	M1	When $k = 1$ $\frac{dy}{dx} = 1 + \ln x$ If there is a point of inflection $\frac{d^2y}{dx^2} = 0$ $\frac{d^2y}{dx^2} = \frac{1}{x} \neq 0$ Therefore, C has no point of inflection.
	Obtains $\frac{d^2y}{dx^2} = \frac{1}{x}$	1.1a	A1	
	Completes reasoned argument by comparing $\frac{1}{x}$ with zero and concludes that there is no point of inflection.	2.1	R1	
	Subtotal		3	

	Question 10 Total		13	
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