

Q	Marking instructions	AO	Marks	Typical solution
16(a)	Obtains $\frac{1}{2}$	1.1b	B1	0.5
	Subtotal		1	

Q	Marking instructions	AO	Marks	Typical solution
16(b)(i)	Obtains $\frac{\left(\frac{e^{1-(n+1)}}{2^{n+1}}\right)}{\left(\frac{e^{1-n}}{2^n}\right)}$ Or $\frac{e^{1-(n+1)}}{2^{n+1}} \times \frac{2^n}{e^{1-n}}$ Or substitutes an integer value for $n \geq 1$ correctly obtains $\frac{1}{2e}$ with no errors	2.1	B1	$\frac{u_{n+1}}{u_n} = \frac{\left(\frac{e^{1-(n+1)}}{2^{n+1}}\right)}{\left(\frac{e^{1-n}}{2^n}\right)}$ $= \frac{2^n e^{1-(n+1)}}{2^{n+1} e^{1-n}}$ $= 2^{-1} e^{-1}$ $= \frac{1}{2e}$
	Simplifies to obtain correct power of e or correct power of 2 starting from $\frac{\left(\frac{e^{1-(n+1)}}{2^{n+1}}\right)}{\left(\frac{e^{1-n}}{2^n}\right)}$ or $\frac{e^{1-(n+1)}}{2^{n+1}} \times \frac{2^n}{e^{1-n}}$ OE with at least one line of correct working before reaching $2^{-1} e^{-1}$ or $\frac{1}{2e}$ condone starting from $\frac{\left(\frac{e^{1-n+1}}{2^{n+1}}\right)}{\left(\frac{e^{1-n}}{2^n}\right)}$	1.1a	M1	
	Completes reasoned argument to show $\frac{u_{n+1}}{u_n} = \frac{1}{2e}$ CSO	2.1	R1	
	Subtotal		3	

Q	Marking instructions	AO	Marks	Typical solution
16(b)(ii)	States $-1 < \frac{1}{2e} < 1$ Or states $r = \frac{1}{2e}$ and $-1 < r < 1$ Accept $0 < \frac{1}{2e} < 1$ OE	2.4	E1	$-1 < \frac{1}{2e} < 1$
	Subtotal		1	

Q	Marking instructions	AO	Marks	Typical solution
16(c)	Substitutes their u_1 or $\frac{1}{2e}$ into sum to infinity formula	1.1a	M1	$\frac{\frac{1}{2}}{1 - \frac{1}{2e}}$ $= \frac{1}{2\left(1 - \frac{1}{2e}\right)} = \frac{e}{2e - 1}$
	Substitutes $\frac{1}{2}$ and $\frac{1}{2e}$ into sum to infinity formula	1.1b	A1	
	Completes reasoned argument to obtain $\frac{e}{2e - 1}$	2.1	R1	
	Subtotal		3	

	Question 16 Total		8	
--	--------------------------	--	----------	--