Q	Marking Instructions	AO	Marks	Typical Solution
8	Explains clearly that $f(x)$ is increasing $\Leftrightarrow f'(x) > 0$ (for all values of x) or Explains $\Rightarrow f(x)$ is increasing $f'(x) > 0$ for all values of x This may appear at any appropriate point in their argument	AO2.4	E1	For all x, $f'(x) > 0 \Rightarrow f(x)$ is an increasing function $f(x) = x^3 - 3x^2 + 15x - 1$ $\Rightarrow f'(x) = 3x^2 - 6x + 15$ $\Rightarrow f'(x) = 3(x-1)^2 + 12$ $\therefore f'(x)$ has a minimum value of 12 therefore $f'(x) > 0$ for all values of x **OR** for $f'(x)$, $b^2 - 4ac = -144$ $\therefore f'(x) \neq 0$ for any real x, so $f'(x)$ is either always positive or always negative. $f'(0) = 15$ therefore $f'(x) > 0$ for all values of x **OR** $f''(x) = 6x - 6$, which $= 0$ when $x = 1$ so min $f'(x)$ is $f'(1) = 12$ therefore $f'(x) > 0$ for all values of x Thus, since, $f'(x) > 0$ for all values of x it is proven that $f(x)$ is an increasing function.
	Differentiates – at least two correct terms	AO1.1a	M1	
	All terms correct	AO1.1b	A1	
	Attempts a correct method which could lead to $f'(x) > 0$	AO3.1a	M1	
	Correctly deduces $f'(x) > 0$ (for all values of x)	AO2.2a	A1	
	Writes a clear statement that links the steps in the argument together, the deduction about a positive gradient for all values of x proves that the given function is increasing for all values of x	AO2.1	R1	
	Total		**6**	