

Question	Answer	Marks	Guidance
9(a)	$y = x^3 - 3x + 3$ and $y = 2x^3 - 4x^2 + 3 \Rightarrow x^3 - 4x^2 + 3x [= 0]$	M1	Reducing to 3-term cubic or quadratic if x cancelled.
	$[x](x-1)(x-3)[= 0]$	DM1	Factorising the cubic or quadratic.
	$x = 0, 1$ and 3 { $x = 0$ may be seen in the working}	A1	SC B1 for $x = 1, 3$ only, with no M marks awarded.
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Question	Answer	Marks	Guidance
9(b)	Attempt at integration of both functions. Can be before or after subtraction of the functions or integrals	M1	Expect integration of $\int \left((x^3 - 3x + 3) - (2x^3 - 4x^2 + 3) \right) dx$ or $\int (-x^3 + 4x^2 - 3x) dx$. At this stage, subtraction can be done either way.
	$= \pm \left(-\frac{x^4}{4} + \frac{4x^3}{3} - \frac{3x^2}{2} \right)$ or $\pm \left\{ \left(\frac{x^4}{4} - \frac{3}{2}x^2 + 3x \right) - \left(\frac{2}{4}x^4 - \frac{4}{3}x^3 + 3x \right) \right\}$	A1	OE \pm covers A1 being awarded to those who subtract the 'other' way.
	$= \left[\left(-\frac{81}{4} + \frac{108}{3} - \frac{27}{2} \right) - \left(-\frac{1}{4} + \frac{4}{3} - \frac{3}{2} \right) \right],$ or $\left(\frac{81}{4} - \frac{27}{2} + 9 \right) - \left(\frac{1}{4} - \frac{3}{2} + 3 \right) - \left\{ \left(\frac{81}{2} - \frac{108}{3} + 9 \right) - \left(\frac{1}{2} - \frac{4}{3} + 3 \right) \right\}$	DM1	OE Minimum required is $\left(\frac{63}{4} - \frac{7}{4} \right) - \left(\frac{27}{2} - \frac{13}{6} \right)$, i.e. four fractions. Correctly apply limits <i>their</i> 1 and 3. Do not allow if $x=0$ used. Need at least one correct substitution in every bracket. If two integrals, need to see substitution into both. Allow one sign error only in each expression, if brackets are not shown.
	$= \frac{8}{3}$	A1	Accept if this comes from use of limits $f(1) - f(3)$ or $\int (x^3 - 4x^2 + 3x) dx$, if $\left \frac{-8}{3} \right $ used. Only dependent on the first method mark. Accept AWRT 2.67.
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