Integration Homework - Marking Scheme

Question	Main points of expected responses	
1 (*a*)	•1 Answer	•1 $x - \frac{x^2}{2} + c$
1 (*b*)	•1 Answer	•1 $x^3 + 2x^2 + 5x + \text{c}$
1 (*c*)	•1 Format •2 Answer	•1 $1 - 6x + 9x^2$ •2 $x - 3x^2 + 3x^3 + c$
1 (*d*)	•1 Format •2 Answer	•1 $x^2 - 2 + x^{-2}$ •2 $\frac{x^3}{3} - 2x - \frac{1}{x} + \text{c}$ OR equvi.
1 (*e*)	•1 Format •2 Integration •3 Tidy up	•1 $x^{\frac{3}{2}} + 2x^{-\frac{1}{2}}$ •2 $\frac{x^{\frac{5}{2}}}{\frac{5}{2}} + \frac{2x^{\frac{1}{2}}}{\frac{1}{2}}$ •3 $\frac{2}{5}\sqrt{x^5} + 4\sqrt{x} + c$
2	•1 Integration •2 substitution for c •3 Full solution	•1 $y = x^3 - 5x^2 + c$ •2 $c = 6$ •3 $y = x^3 - 5x^2 + 6$
3	•1 Format •2 Integration •3 Substitution •4 Answer	•1 $x^2 + x^{-2}$ •2 $\frac{x^3}{3} + \frac{1}{x}$ *OR equivalent* •3 $\left[\frac{3^3}{3} + \frac{1}{3}\right] - \left[\frac{1^3}{3} + 1\right]$ •4 8

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4	•1	Integration	•1	$\left[\frac{x^{\frac{1}{3}}}{\frac{1}{3}}\right]=3$
	•2	Format	•2	$\left[3\sqrt[3]{x}\right]=3$
	•3	Substitution	•3	$3\sqrt[3]{c}-\ 3\sqrt[3]{8}=3$
	•4	Solve	•4	$\sqrt[3]{c}-\ \sqrt[3]{8}=1$ $\sqrt[3]{c}-\ 2=1$ $\sqrt[3]{c}=3$ $c=27$
5	•1	Identify Roots	•1	$x=1,3$
	•2	Format for Integration	•2	x^2-4x+3
	•3	Integration for 0 to 1	•3	$\left[\frac{x^3}{3}-2x^2+3x\right]$
	•4	Solution 0 to 1	•4	$\left[\frac{1^3}{3}-2(1)^2+3(1)\right]-[0]$ $=\frac{4}{3}$
	•5	Solution for 1 to 3	•5	$=-\frac{4}{3}$
	•6	Statement or implied	•6	Since underneath x-axis take positive value.
	•7	Answer	•7	$\frac{4}{3}+\frac{4}{3}=\frac{8}{3}$ units^2

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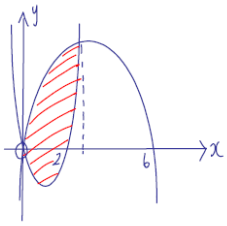
6	•1,2 Both sketched with roots	•1,2 
	•3 functions equal to each other	•3 $x^2 - 2x = 6x - x^2$
	•4 solve	•4 $x = 0, 4$
	•5 Top – bottom	•5 $\int_0^4 (8x - 2x^2)\, dx$
	•6 Integration with limits 0 to 4	•6 $\left[4x^2 - \frac{2x^2}{3}\right]$
	•7 Substitution	•7 $\left[4(4)^2 - \frac{2(4)^2}{3}\right] - [0]$
	•8 Solution	•8 $= \frac{64}{3}$ units^2

Total 35 marks