4. **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

(i) Using the laws of indices, solve

$$2^{4k-3} = \frac{8^{1-k}}{4\sqrt{2}}$$

(3)

(ii) Solve the equation

$$\frac{x\sqrt{3}+2}{\sqrt{3}-1} = x\sqrt{3} - 4$$

giving the answer in the form $a + b\sqrt{3}$, where a and b are rational numbers.

(4)

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Question 4 continued

Question 4 continued

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Question 4 continued

(Total for Question 4 is 7 marks)

5. $y = \frac{1}{2}x^4 - 3 + \frac{10}{x^2} \qquad x \neq 0$

(a) Find $\int y \, dx$ writing the answer in simplest form.

(3)

(b) (i) Find $\frac{dy}{dx}$ writing the answer in simplest form.

(3)

(ii) Hence find the exact solutions of the equation $\frac{dy}{dx} = 3$

(*Solutions relying on calculator technology are not acceptable.*)

(4)

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