

## STEP II, 2009, Q5

5 Expand and simplify  $(\sqrt{x-1} + 1)^2$ .

(i) Evaluate

$$\int_5^{10} \frac{\sqrt{x+2\sqrt{x-1}} + \sqrt{x-2\sqrt{x-1}}}{\sqrt{x-1}} dx.$$

(ii) Find the total area between the curve

$$y = \frac{\sqrt{x-2\sqrt{x-1}}}{\sqrt{x-1}}$$

and the  $x$ -axis between the points  $x = \frac{5}{4}$  and  $x = 10$ .

(iii) Evaluate

$$\int_{\frac{5}{4}}^{10} \frac{\sqrt{x+2\sqrt{x-1}} + \sqrt{x-2\sqrt{x-1}} + 2}{\sqrt{x^2-1}} dx.$$



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