

## STEP II, 2007, Q6

- 6 (i) Differentiate  $\ln(x + \sqrt{3 + x^2})$  and  $x\sqrt{3 + x^2}$  and simplify your answers.  
Hence find  $\int \sqrt{3 + x^2} dx$ .
- (ii) Find the two solutions of the differential equation

$$3 \left( \frac{dy}{dx} \right)^2 + 2x \frac{dy}{dx} = 1$$

that satisfy  $y = 0$  when  $x = 1$ .



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