

STEP II, 2014, Q5

5 Given that $y = xu$, where u is a function of x , write down an expression for $\frac{dy}{dx}$.

(i) Use the substitution $y = xu$ to solve

$$\frac{dy}{dx} = \frac{2y + x}{y - 2x}$$

given that the solution curve passes through the point $(1, 1)$.

Give your answer in the form of a quadratic in x and y .

(ii) Using the substitutions $x = X + a$ and $y = Y + b$ for appropriate values of a and b , or otherwise, solve

$$\frac{dy}{dx} = \frac{x - 2y - 4}{2x + y - 3}$$

given that the solution curve passes through the point $(1, 1)$.



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