

STEP III, 2012 Q1 MS

1. The stem integrates to give $z = y^n \left(\frac{dy}{dx}\right)^2$ and for part (i) using $n = 1$, the stem gives $\frac{dz}{dx} = \sqrt{y} \frac{dy}{dx}$ which can be solved for z using the initial conditions, and the integrated stem is a first order differential equation for y , which when solved, again with the initial conditions, produces the required result. Part (ii) follows the same pattern, with $n = -2$ instead, which has solution $y = e^{\frac{1}{2}x^2}$.



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