

Solution (#1610) (i) Make the substitution

$$z = x - 2y,$$

to find

$$z' = \cos 2z.$$

The solution is

$$y = \frac{x}{2} + \frac{\pi}{8} - \frac{1}{2} \tan^{-1}(Ae^{2x})$$

for some constant A .

(ii) Set

$$z = xy$$

The solution is

$$y = -\frac{\ln(c-x)}{x} \quad (c \text{ constant}).$$