Section 3: Implicit differentiation

Exercise level 2

1. Differentiate with respect to x:

   (i) xy^2 (ii) $x\sin y$ (iii) $\dfrac{y}{1+x}$.

2. Given that $x^3+y^3-3x-6=0$, find $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ in terms of x and y. Hence find the turning points of this curve.

3. Given that $y^2=\dfrac{x^2}{1+2x}$, show that $\dfrac{\mathrm{d}y}{\mathrm{d}x}=\dfrac{x(1+x)}{y(1+2x)^2}$.

   Hence find $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ in terms of x.

4. Given that $y=2^x$, find $\ln y$ in the form kx, where k is a constant. By differentiating the resulting equation implicitly, deduce that $\dfrac{\mathrm{d}y}{\mathrm{d}x}=2^x\ln 2$.