Question
transform the following equations into cartesian co-ordinates and identify the curves they represent.

(i) $r^2 \cos\theta = 1$

(ii) $r^2 \sin 2\theta = 1$

Answer

(i) $r^2 \cos\theta = 1$ so $r^2(\cos^2\theta - \sin^2\theta) = 1$

Thus in cartesian $x^2 + y^2 = 1$ which is a rectangular hyperbola.

(ii) $r^2 \sin 2\theta = 1 \Rightarrow 2r^2 \sin\theta\cos\theta = 1$

Thus in cartesian $2xy = 1$ which is a rectangular hyperbola.