PARAMETRIC AND CARTESIAN EQUATIONS

1 For the curves whose parametric equations are given, find:

(i) the Cartesian equation **(ii)** the vector equation.

(a) $x = 2t, y = t + 2, t \geq 0$

(b) $x = t, y = \frac{1}{t}, t > 0$

(e) $x = u^3, y = 1 - u^2, -1 \leq u \leq 1$

(g) $x = \cos 2\theta, y = \cos\theta, 0 \leq \theta \leq 2\pi$

2 For the curves whose parametric equations are given, find:

(i) the Cartesian equation **(ii)** the vector equation.

(a) $x = \frac{2t}{1+t^2}, y = \frac{1-t^2}{1+t^2}, t \in R$

(b) $x = a\sin\phi, y = b\cos\phi, \phi \in R$

3 For the curves whose vector equations are given, find:

(i) the parametric equation **(ii)** the Cartesian equation.

(e) $\underset{\sim}{r} = (2 - \sin\theta)\underset{\sim}{i} + (1 + \cos\theta)\underset{\sim}{j}, 0 \leq \theta \leq 2\pi$

(f) $\underset{\sim}{r} = \left(t + \frac{1}{t}\right)\underset{\sim}{i} + \left(t - \frac{1}{t}\right)\underset{\sim}{j}, t \neq 0$

5 The position of a particle at any time, t, is $\underset{\sim}{r}(t) = (4\cos 3t)\underset{\sim}{i} + (4\sin 3t)\underset{\sim}{j}$.

(a) Show that the path is circular.

(b) Find the Cartesian equation of the path.

(c) Find the value of $\left|\underset{\sim}{r}\right|$.