Exercise 6.5

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Sketching of Curves in Polar Coordinates:

To sketch the graph of a curve whose equation is given in polar coordinates, the following properties of the curve should be examined.

I. Symmetry about the initial Line: (x-axis)

The curve is symmetric about the initial line if the curve remains the same on changing (r, θ) to $(r, -\theta)$ or $(-r, \pi - \theta)$ e.g.

$$r = a\cos\theta$$
$$r = a\cos(-\theta)$$
$$r = a\cos\theta$$

∵ There is no change in the curve

∴ It is symm. about the initial line.

II. Symmetry about the line $\theta = \frac{\pi}{2}$: (y-axis)

The curve is symmetric about the line $\theta = \pi/2$ (y-axis) if it remains the same on replacing (r, θ) by $(-r, -\theta)$ or $(r, \pi - \theta)$

III. Symmetry about the pole:

The curve is symmetric w.r.t. pole (origin) if there is no change in the curve on replacing (r, θ) by $(-r, \theta)$.

e.g. $r^2 = a\sin\frac{\theta}{2}$

$$(-r)^2 = a\sin\frac{\theta}{2}$$
$$r^2 = a\sin\frac{\theta}{2}$$

∵ There is no change in the curve

∴ It is symmetric about pole.

IV Position of the Pole relative to the Curve.

Check wether the pole lies on the curve by putting $r = 0$ in the given eq. and find the corresponding value of θ.

V Table of Values.

Construct a sufficiently complete table of values. This can be a great help in sketching the graph of a curve.

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Sketch the graph of each of the curves.
(1-15)

Please see these Questions on
Graph Book.

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