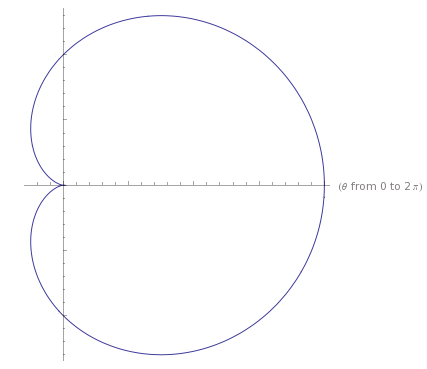
Tangents and Normals

Remember how you found the gradient given equations in parametric form.

In the same way for polar coordinates:

We can find the gradient at any point by differentiating parametrically.

* If  **the tangent is parallel to the initial line**
* If  **the tangent is perpendicular to the initial line.**



Eaxmple

Find the coordinates of the points on where the tangents are parallel to the initial line .

Test Your Understanding

The curve has polar equation

At the point on , the tangent to is parallel to the initial line.

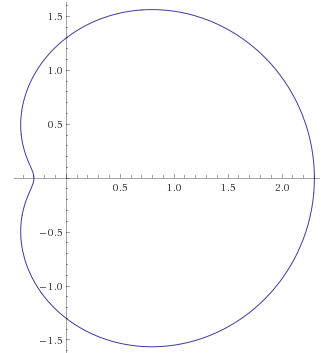
Given that is the pole, find the exact length of the line .

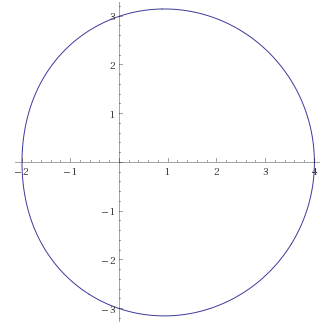
Example

Find the equations and the points of contact of the tangents to the curve

that are (a) parallel to the initial line and (b) perpendicular to the initial line.

Proof of dimple vs egg

Prove that for we have a ‘dimple’ if .



Ex 5D pg 115