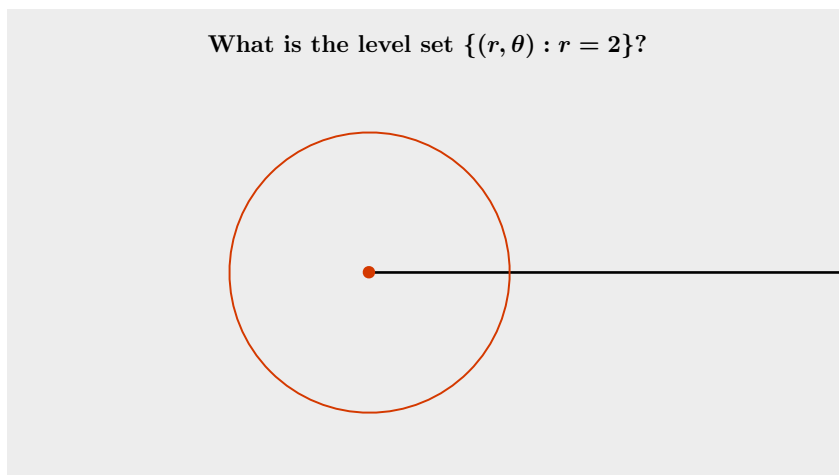
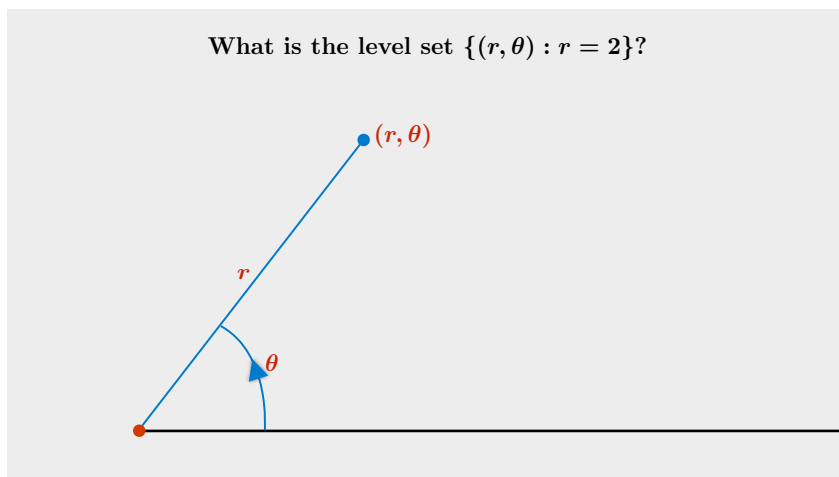
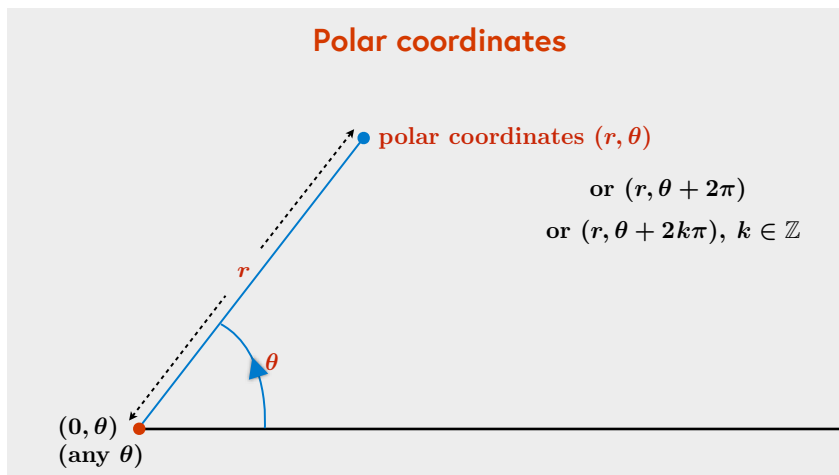
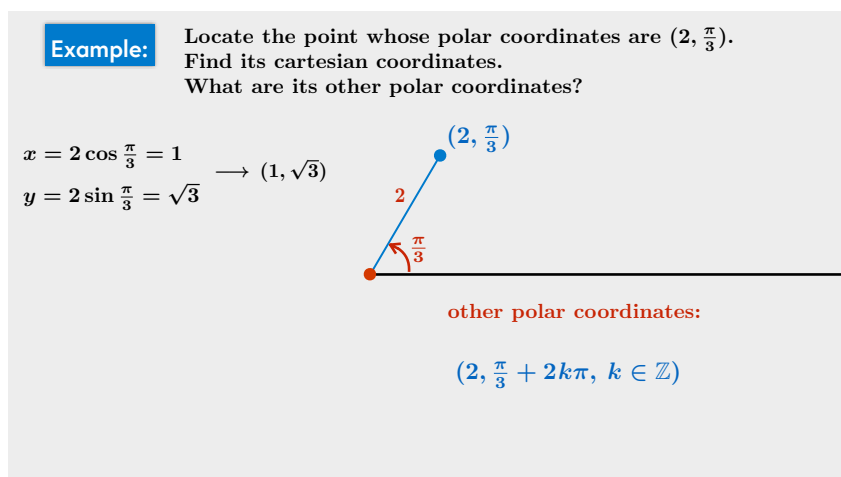
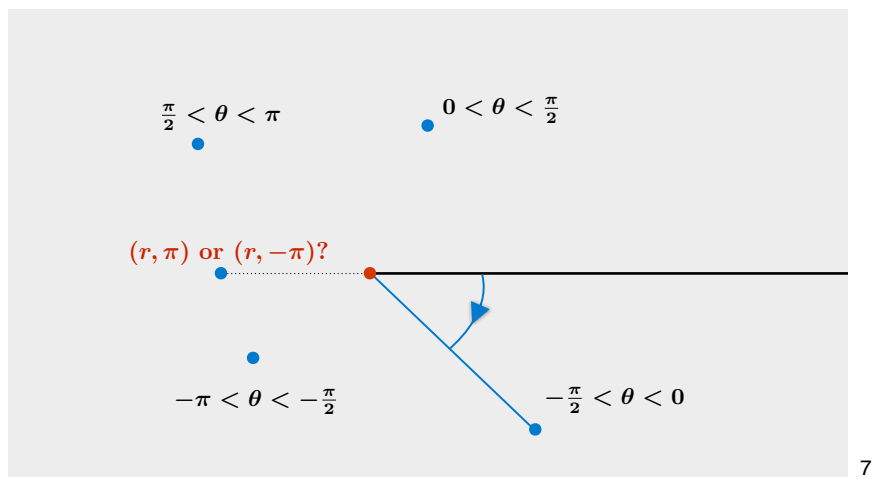
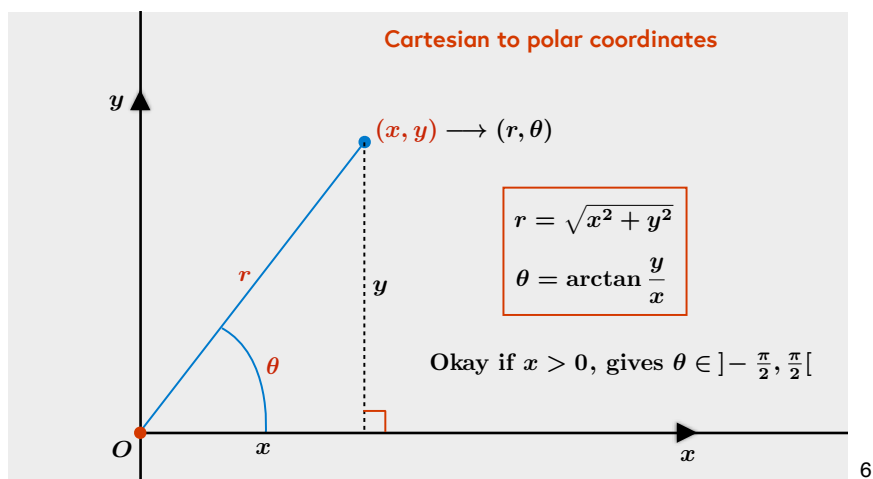
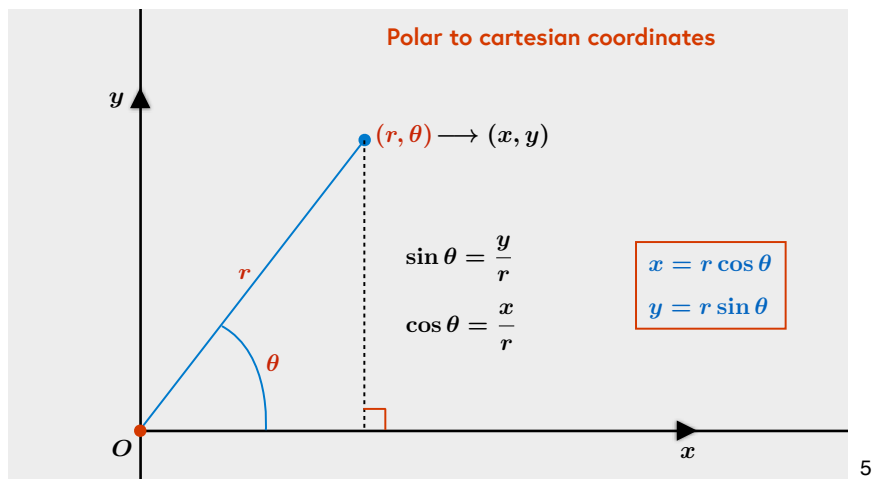


Polar coordinates

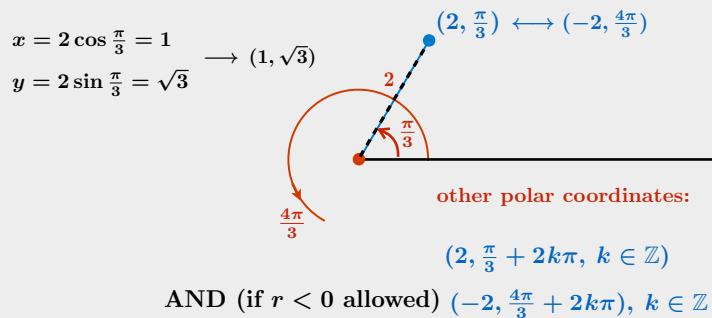
1





Example:

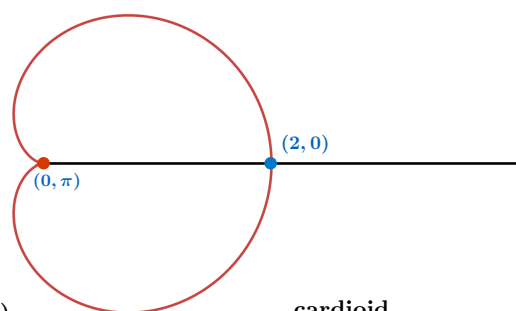
Locate the point whose polar coordinates are $(2, \frac{\pi}{3})$.
Find its cartesian coordinates.
What are its other polar coordinates?



9

Graphs in polar coordinates**Example:**

Sketch the graph of $r = 1 + \cos \theta$



$$\cos(\pi + a) = \cos(\pi - a)$$

cardioid

10

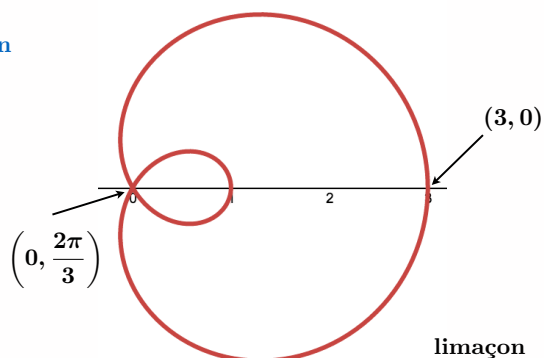
Example:

$$r = 1 + 2 \cos \theta$$

$r = 0$ first when

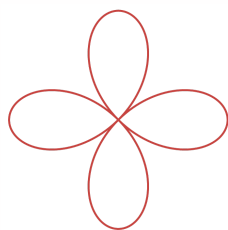
$$\cos \theta = -\frac{1}{2}$$

$$\Rightarrow \theta = \frac{2\pi}{3}$$



limaçon

11



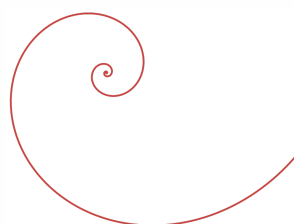
$$r = a \cos(2\theta)$$

four-leaved
(or -petaled) rose



$$r = a\theta$$

spiral of Archimedes



$$r = a e^{b\theta}$$

logarithmic spiral
(of Johan Bernoulli)

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