Lecture 13

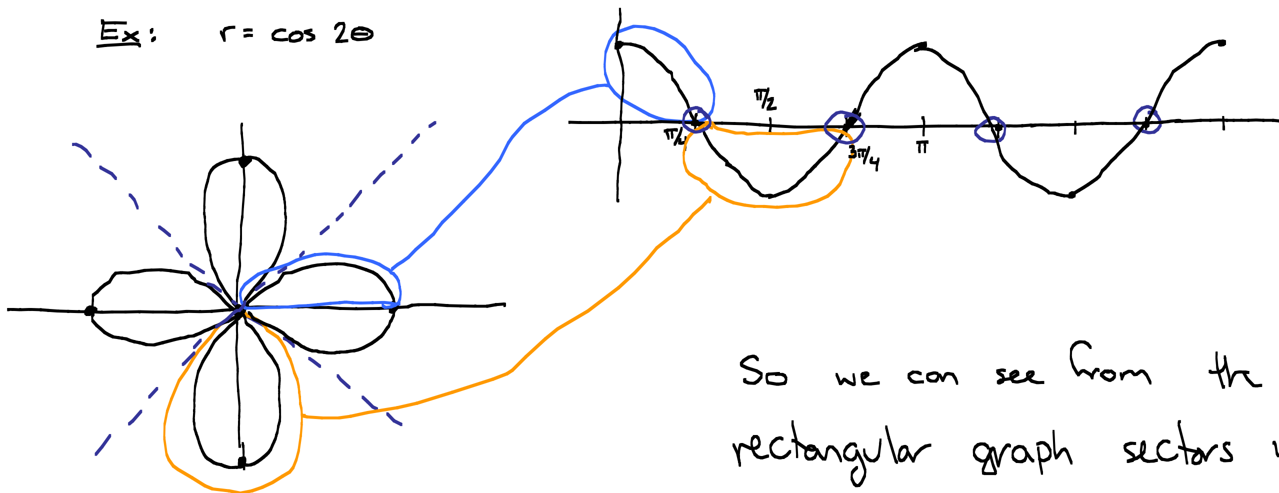
Note Title

Sketching polar curves:

① plot points

② plot $r = r(\theta)$ in rect. coords and use this to sketch.

Ex: $r = \cos 2\theta$

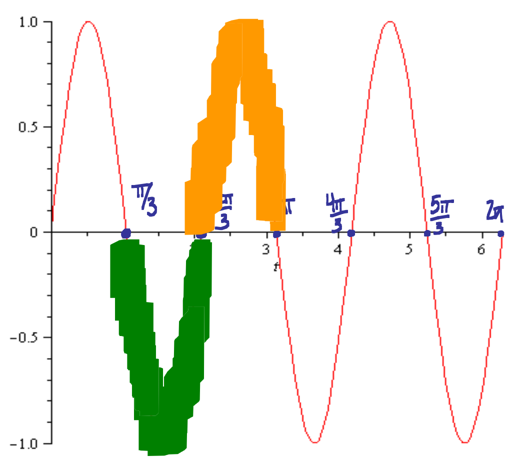


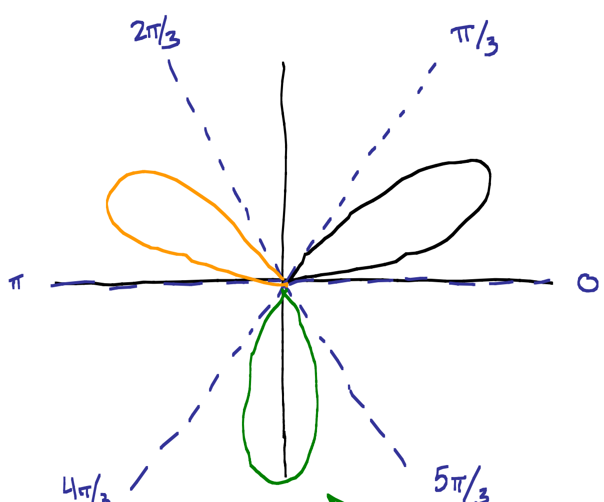
So we can see from the rectangular graph sectors where the behavior is understandable.

Ex: $r(\theta) = \sin 3\theta$

Between 0 & $\pi/3$, go from 0 to 1 and back.
Between $\pi/3$ & $2\pi/3$, go from 0 to -1 & back, etc.

$\Leftarrow$





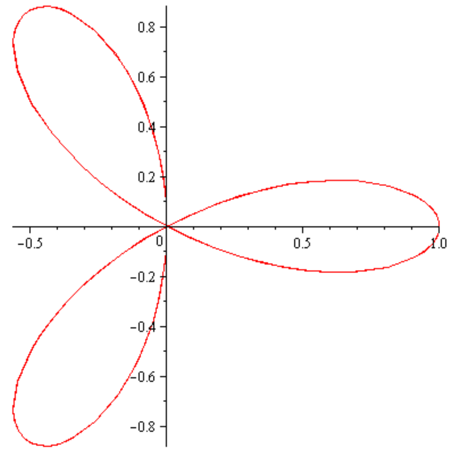
down here b/c $r \leq 0$

Then it repeats.

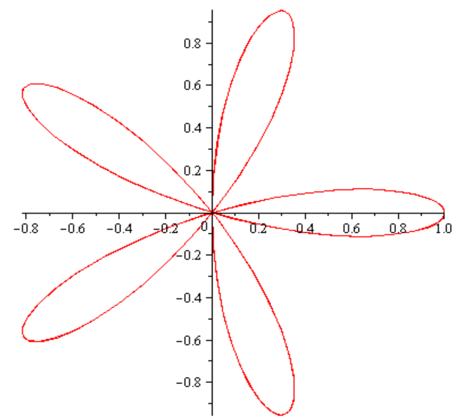
Polar Beshiary

$r = \cos 3\theta$

(= $r = \sin 3\theta$ rotated)



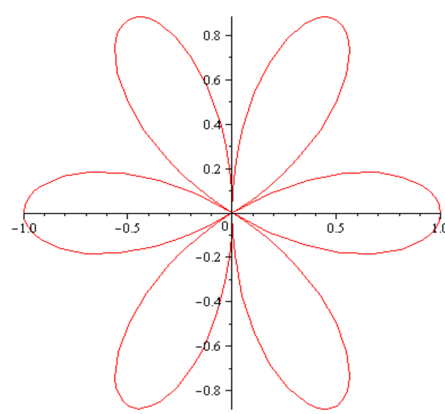
$r = \cos 5\theta$

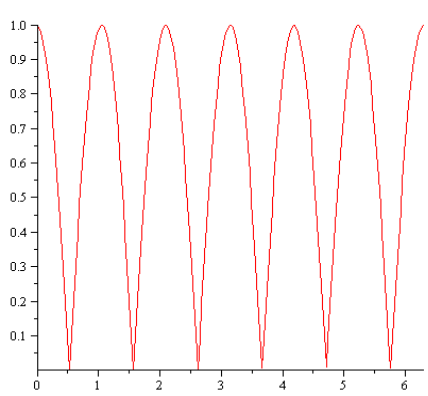


Why does $\cos 2\theta$ have 4 leaves and $\cos 3\theta$ have 3?

$r = \cos((\text{odd})\,\theta)$ double traces the graph. $r = \cos((\text{even})\,\theta)$ does not.

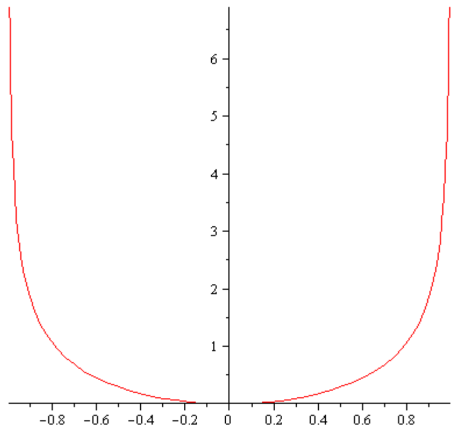
$r = |\cos 3\theta|$



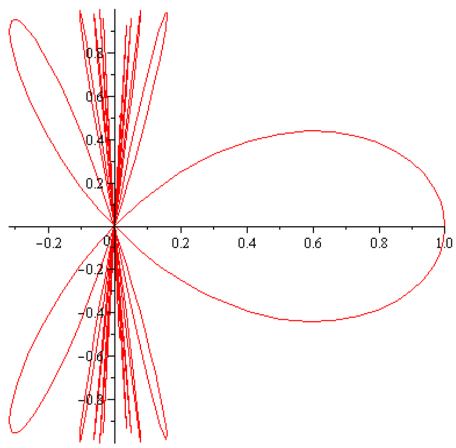


← no negative values, so each lobe is in the right sector

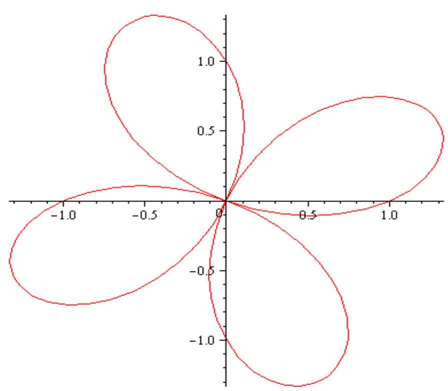
$r = \tan\theta$



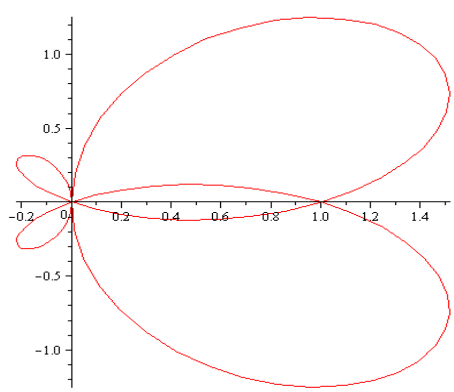
$r = \cos(\tan\theta)$

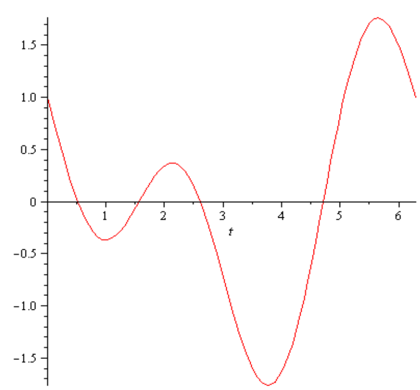


$r = \cos 2\theta + \sin 2\theta$

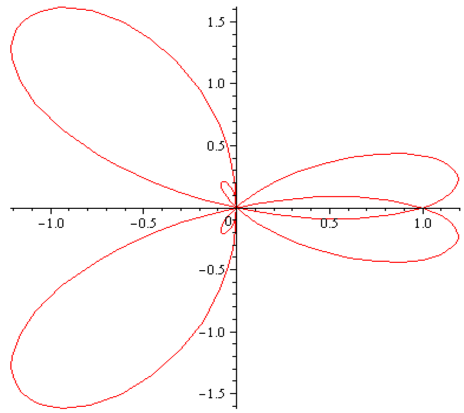


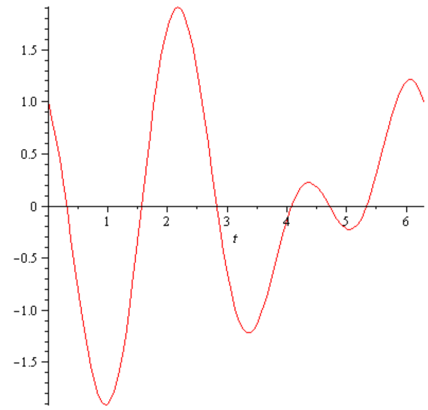
$r = \cos\theta - \sin 2\theta$



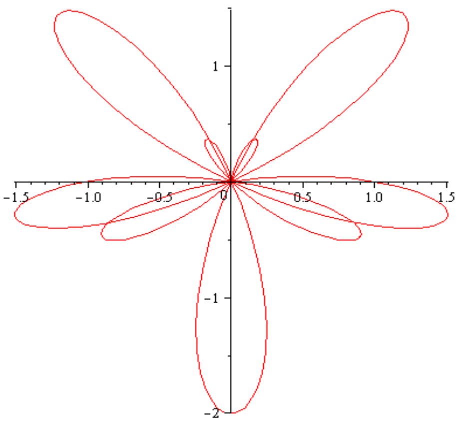


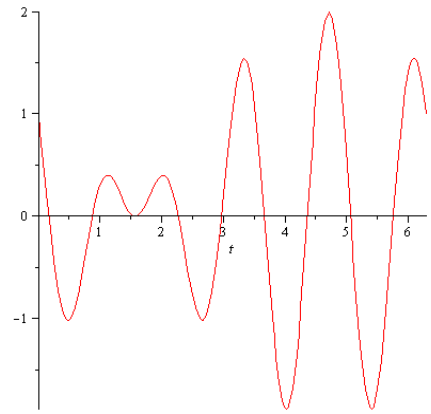
$r = \cos 3\theta - \sin 2\theta$



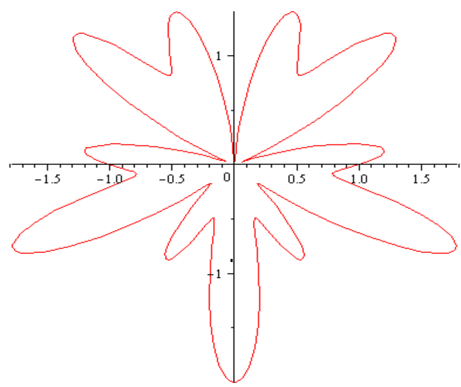


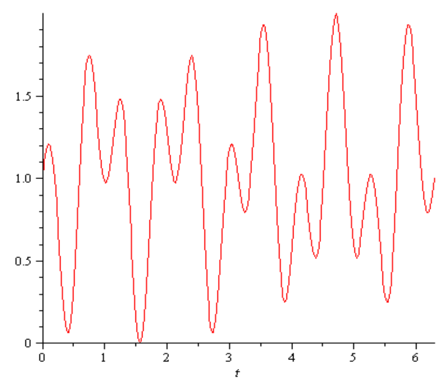
$r = \cos 4\theta - \sin 5\theta$





$r = \sin 3\theta \cos 8\theta + 1$





$r = \sin 7\theta + \cos 4\theta + 1$