7. Hafta Salı Dersi - Kutupsal Eğri Çizimi

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Kutupsal Eğri Çizimi

$r = f(\theta)$

1) Periyodik ise periyodu bulunur.
2) Simetri'ye bakılır. (3 çeşit: $\theta = \pi/2$ Kutup ekseni 0 çizgisine göre)
3) θ'ya göre türev yardımıyla değişime bakılır.
   ($f'(\theta) > 0 \Rightarrow r$ artıyor
   $f'(\theta) < 0 \Rightarrow r$ azalıyor)
4) Bazı θ'lar için r değerleri bulunur.
5) θ, r, r' tablosu yapılır.

Örn $r = a(1+\cos\theta)$, $a > 0$, $f(\theta) = a + a\cos\theta$

- periyot $\rightarrow 0 \le \theta \le 2\pi$
- simetri

Kutup eksenine göre: $f(-\theta) \stackrel{?}{=} f(\theta)$

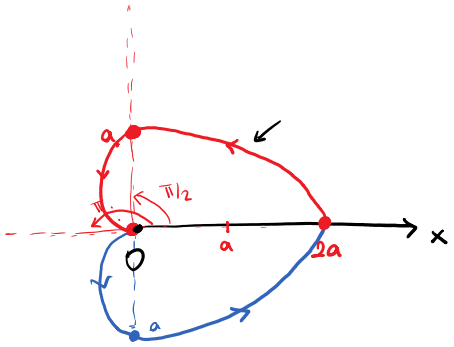
$f(-\theta) = a(1+\underbrace{\cos(-\theta)}_{\cos\theta}) = f(\theta)$ ✓ $\rightarrow 0 \le \theta \le \pi$

Orijine göre: $f(\theta+\pi) \stackrel{?}{=} f(\theta)$

$f(\theta+\pi) = a(1+\underbrace{\cos(\theta+\pi)}_{-\cos\theta}) \neq f(\theta)$ ✗

$\theta = \pi/2$'ye göre: $f(\pi-\theta) \stackrel{?}{=} f(\theta)$

$f(\pi-\theta) = a(1+\underbrace{\cos(\pi-\theta)}_{-\cos\theta}) \neq f(\theta)$ ✗



- türev: $f'(\theta) = -\underbrace{a}_{+}\underbrace{\sin\theta}_{+}$ $(0 \le \theta \le \pi)$

$\Rightarrow f'(\theta) < 0$

$\Rightarrow r$ azalacak.

$f''(\theta) = -a\cos\theta$

θ	r ($a + a\cos\theta$)	r'	r''
0	2a	−	− ∩
$\pi/2$	a	−	
π	0	−	

Örn $r = a(1-\sin\theta)$, $a > 0$

- periyot $\rightarrow 0 \le \theta \le 2\pi$
- simetri

Kutup eksenine göre: $f(-\theta) \stackrel{?}{=} f(\theta)$

$f(-\theta) = a(1-\underbrace{\sin(-\theta)}_{-\sin\theta}) \neq f(\theta)$ ✗

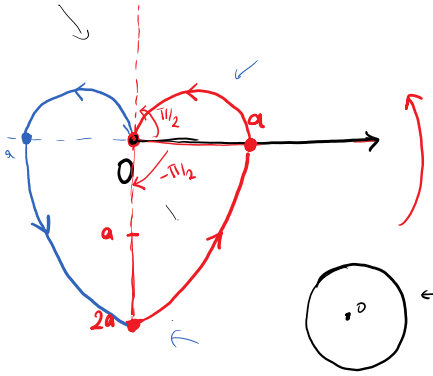
Orijine göre: $f(\theta+\pi) \stackrel{?}{=} f(\theta)$

$f(\theta+\pi) = a(1-\underbrace{\sin(\theta+\pi)}_{-\sin\theta} \neq f(\theta))$ ✗

$\theta = \pi/2$'ye göre: $f(\pi-\theta) \stackrel{?}{=} f(\theta)$

$f(\pi-\theta) = a(1-\underbrace{\sin(\theta-\pi)}_{\sin\theta}) = f(\theta)$ ✓ $\rightarrow -\pi/2 \le \theta \le \pi/2$

- türev



→ $-\pi/2 \leq \theta \leq \pi/2$

– türev

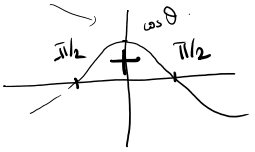
$-\pi/2 \leq \theta \leq \pi/2$

$f(\theta) = a - a\sin\theta$

$f'(\theta) = -a\underbrace{\cos\theta}_{+}$

$f'(\theta) < 0$

→ r sürekli azalacak.



θ	r
$-\pi/2$	2a
0	a
$\pi/2$	0

$r' < 0$

r''

$f''(\theta) = a\sin\theta$