

1a. $\frac{x}{2} + \frac{\sqrt{3}y}{2} - 4 = 0$, titik acuan: $(8,0)$ dan $(4, \frac{\pi}{3})$

i. Persamaan Polar → Garis

$$x = r \cos \theta$$

$$y = r \sin \theta$$

$$r = \frac{p}{\cos(\theta - \theta_0)}$$

$$\frac{r \cos \theta}{2} + \frac{\sqrt{3} r \sin \theta}{2} = 4 \rightarrow r \left(\frac{1}{2} \cos \theta + \frac{\sqrt{3}}{2} \sin \theta \right) = 4$$

$$r = \frac{4}{\cos(\theta - \frac{\pi}{3})}$$

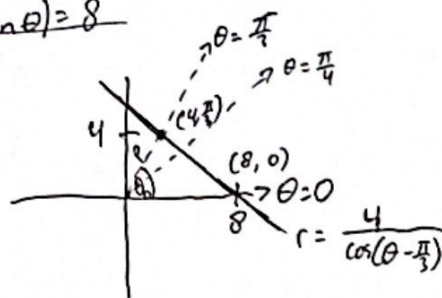
$$r \cos \theta + \sqrt{3} r \sin \theta = 8$$

$$r(\cos \theta + \sqrt{3} \sin \theta) = 8$$

ii. Sketsa

$$r = 8, \theta = 0$$

$$r = 2\sqrt{4}$$



iii. Jarak kurva yang dibentuk dari persamaan dengan titik pole adalah $p = 4$

2a. $r = \frac{2}{2 + \sin \theta} \rightarrow$ mayor ~~kurva~~ y

$r = \frac{1}{1 + \frac{1}{2} \sin \theta} \rightarrow$ eccentricity $(e = \frac{1}{2}) \rightarrow$ ellipse

$$ep = 1$$

$$\frac{1}{2}p = 1$$

$$p = 2$$

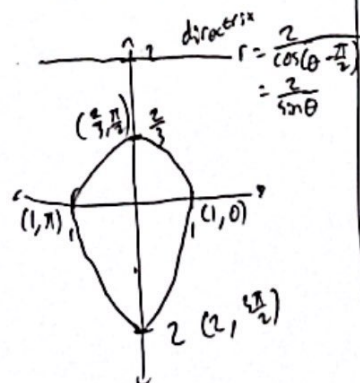
$$\sin \theta = \cos(\theta - \frac{\pi}{2})$$

$$a(1 - e^2) = \frac{p}{e}$$

dir: $r = \frac{p}{\cos(\theta - \theta_0)}$

$$r = \frac{2}{\cos(\theta - \frac{\pi}{2})}$$

sketsa



θ	r
0	1
$\frac{\pi}{2}$	2
π	1
$\frac{3\pi}{2}$	2

3a. $r = 3 \cos(4\theta) \rightarrow$ Rose

(i) Simetri Polar Axis

$$r = r, \theta = -\theta$$

$$r = 3 \cos(4\theta)$$

$$r = 3 \cos(4\theta)$$

\therefore Simetri terhadap Polar Axis

(iii) Simetri garis $\theta = \frac{\pi}{2}$

$$r = r, \theta = (\pi - \theta)$$

$$r = 3 \cos(4(\pi - \theta))$$

$$r = 3 \cos(4\pi - 4\theta) \rightarrow 4\pi = 2\pi + 2\pi = 0 + 0 = 0$$

$$r = 3 \cos(4\theta)$$

$$r = 3 \cos(4\theta)$$

\therefore Simetri terhadap garis $\theta = \frac{\pi}{2}$

(ii) Simetri terhadap pole

$$r = -r, \theta = \theta$$

$$-r = 3 \cos(4\theta)$$

\therefore Tidak simetri terhadap pole

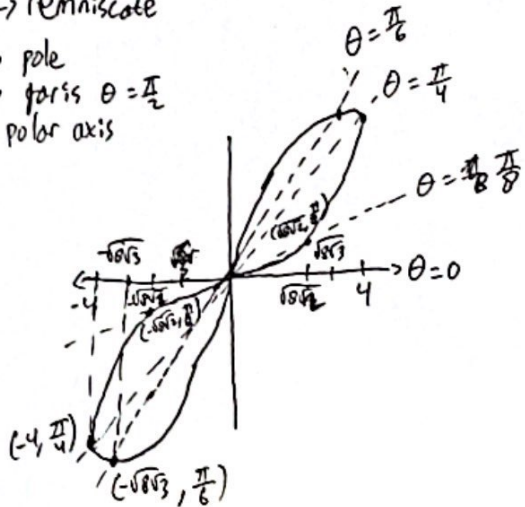
4a. $r^2 = 16 \sin(2\theta) \rightarrow$ Lemniscate

Simetri: terhadap pole

- terhadap garis $\theta = \frac{\pi}{2}$

- terhadap polar axis

r	θ
0	0
0	$\frac{\pi}{2}$
± 4	$\frac{\pi}{4}$
0	$\frac{3\pi}{4}$
$\pm \sqrt{8\sqrt{2}}$	$\frac{\pi}{8}$
$\pm \sqrt{8\sqrt{3}}$	$\frac{\pi}{6}$



5a.

$r = 3 - 2 \cos \theta \rightarrow$ Limacon

luas = ?

$$A = \frac{1}{2} \int_0^{2\pi} r^2 d\theta$$

$$= \frac{1}{2} \int_0^{2\pi} (3 - 2 \cos \theta)^2 d\theta$$

$$= \frac{1}{2} \int_0^{2\pi} 9 - 12 \cos \theta + 4 \cos^2 \theta d\theta$$

$$= \frac{1}{2} \left([9\theta]_0^{2\pi} - [12 \sin \theta]_0^{2\pi} + \int_0^{2\pi} 4 \cdot \frac{1 + \cos 2\theta}{2} d\theta \right)$$

$$= \frac{1}{2} \left([9\theta]_0^{2\pi} - [12 \sin \theta]_0^{2\pi} + [2\theta]_0^{2\pi} + [\cos 2\theta]_0^{2\pi} \right)$$

$$= \frac{1}{2} (18\pi - 0 - 12 \sin(\pi) + 12 \sin(0) + 4\pi - 0 + \cos 4\pi - \cos 0)$$

$$= \frac{1}{2} (22\pi)$$

$$= 11\pi$$

θ	r
0	3
$\frac{\pi}{2}$	3
π	5
$\frac{3\pi}{2}$	4

