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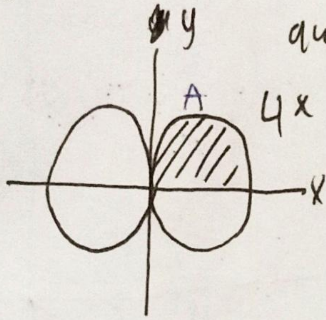
Pop Quiz 7

1.) b) $r^2 = 12\cos\theta \Leftrightarrow r = \pm\sqrt{12\cos\theta}$ dengan $12\cos\theta \geq 0$

quadran I $\Rightarrow 0 \leq \theta \leq \pi/2$

θ	r
0	$\pm 2\sqrt{3}$
$\pi/2$	0
π	TM
$3\pi/2$	0



4x

$$4A = \frac{1}{2}\cdot 4\int_0^{\pi/2} f(\theta)^2\, d\theta$$

$$= 2\int_0^{\pi/2} 12\cos\theta\, d\theta$$

$$= 24\sin\theta \Big|_0^{\pi/2} = 24\left(\sin\frac{\pi}{2} - \sin 0\right)$$

$$= 24 \;//$$

$\Rightarrow$ tes replace $(-r, \theta) \Rightarrow r^2 = 12\cos\theta$ simetris polar

$(r, \theta) \Rightarrow r^2 = 12\cos\theta$ — " — sb. y

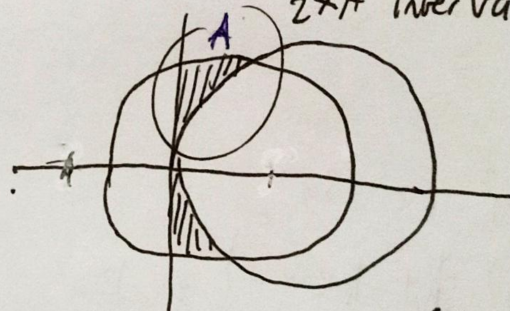
$(-r, -\theta) \Rightarrow r^2 = 12\cos\theta$ — " — sb. x

2.) b) Cardioid $r = 2\sqrt{3} + \cos\theta$ dan circle $r = 5\cos\theta$

θ	r
0	$2\sqrt{3}+1$
90°	$2\sqrt{3}$
180°	$2\sqrt{3}-1$
270°	$2\sqrt{3}$

θ	r
0°	5
90°	0
180°	-5
270°	0

$2\times A$ interval $\frac{\pi}{6} \leq \theta \leq \frac{\pi}{2}$



$2\sqrt{3} + 1 \sim 5$

$2\sqrt{3} \sim 4$

$12 < 16$

$\Rightarrow$ Tipot $r = r$

$2\sqrt{3} + \cos\theta = 5\cos\theta$

$2\sqrt{3} = 4\cos\theta$

$\cos\theta = \frac{1}{2}\sqrt{3}$

$\theta = \pm\frac{\pi}{6} + \pi k,\ k \in \mathbb{Z}$

• Cek simetris sb. x $\Rightarrow (r, -\theta)$

$r = 2\sqrt{3} + \cos\theta$ ✓

$r = 5\cos\theta$ ✓

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$$2A = \frac{1}{2}\cdot 2\int_{\pi/6}^{\pi/2} \text{card}^2 - \text{circ}^2 = \int_{\pi/6}^{\pi/2} (2\sqrt{3}+\cos\theta)^2 - 25\cos^2\theta \, d\theta$$

$$= \int_{\pi/6}^{\pi/2} 12 + 4\sqrt{3}\cos\theta + \cos^2\theta - 25\cos^2\theta \, d\theta$$

$$= \int_{\pi/6}^{\pi/2} 12 + 4\sqrt{3}\cos\theta - \cancel{24}^{12}\,\frac{\cos 2\theta + 1}{\cancel{2}} \, d\theta = \left(\cancel{12\theta} + 4\sqrt{3}\sin\theta - \frac{12}{2}\sin 2\theta - \cancel{12\theta}\right)\Bigg|_{\frac{\pi}{6}}^{\frac{\pi}{2}}$$

$$= \left(4\sqrt{3}\sin\frac{\pi}{2} - 6\sin\pi\right) - \left(4\sqrt{3}\sin\frac{\pi}{6} - 6\sin\frac{\pi}{3}\right)$$

$$= (4\sqrt{3}\cdot 1 - 6\cdot 0) - 4\sqrt{3}\,\frac{1}{2} + 6\cdot\frac{\sqrt{3}}{2} = \sqrt{3}(4 - 2 + 3) = 5\sqrt{3}$$

//

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3) a.) $f(x,y) = 4x^2 + y^2 - 16$ $c=0$, $c=9$

$c=0$

$\Rightarrow 4x^2 + y^2 - 16 = 0$ $(:16)$

$\frac{x}{4} + \frac{y^2}{16} = 1$ ellips $(2, 4)$ vertikal ~~horizontal~~ (b, a)

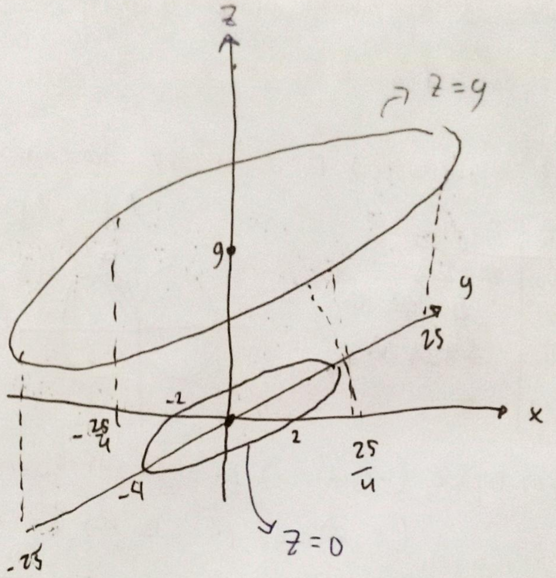
vertens $= 4$

$c=9 \Rightarrow 4x^2 + y^2 - 16 = 9$

$4x^2 + y^2 = 25$ $(:25)$

$\frac{x^2}{25/4} + \frac{y^2}{25} = 1$ ellips $(\frac{25}{4}, 25)$ vertikal (b, a)

vertens $= 25$



4) a.) $f(x,y) = xy^2 - 6x^2 - 3y^2$

$\Rightarrow f_{xx}(x,y) = \frac{\partial(y^2 - 12x - 0)}{\partial x} = -12$

$\Rightarrow f_{xy} = f_{yx} = \frac{\partial}{\partial x}\frac{\partial}{dy}\left(xy^2 - 6x^2 - 3y^2\right) = \frac{\partial}{\partial x}(2xy - 0 - 6y) = 2y$

$\Rightarrow f_{yy}(x,y) = \frac{\partial(2xy - 0 - 6y)}{\partial y} = 2x - 6$

$D(1,-1) = f_{xx} \cdot f_{yy} - f_{xy}^2$

$= -12(2x - 6) - (2y)^2$ substitusi:

$= -24x + 72 - 4y^2 = -24 + 72 - 4(-1)^2 = 44$ //