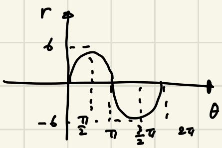
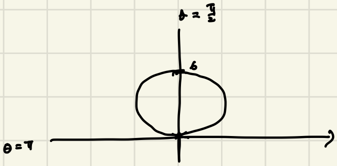
2018113338 통계학과 조성준 과제④

연습문제 11.2

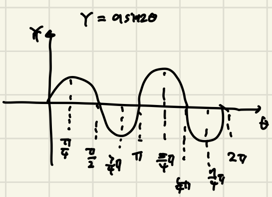
1-(3) $r = 6\sin\theta$

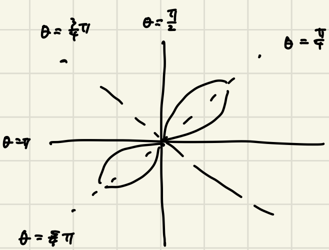




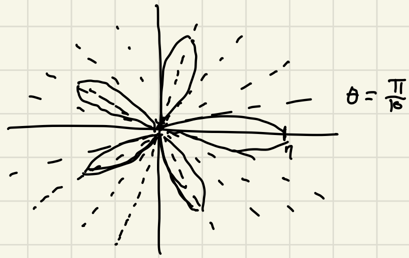
1-(9) $r^2 = 9\sin 2\theta$

$(-r)^2 = r^2 = 9\sin 2\theta$ 이므로 극축 대칭이다.



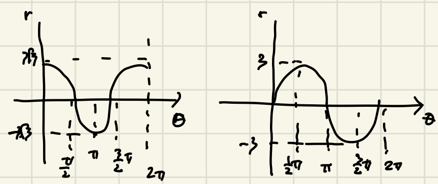


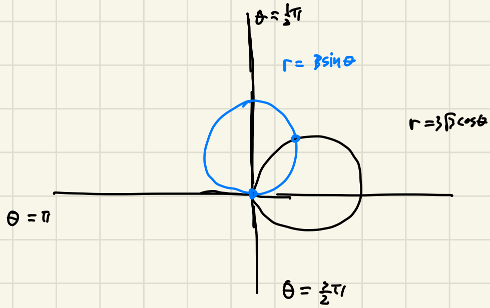
1-(13) $r = 7\cos 5\theta$



2-(2)

$r = 3\sqrt{3}\cos\theta$, $r = 3\sin\theta$





$3\sqrt{3}\cos\theta = 3\sin\theta$

$\Leftrightarrow\ 3\cos^2\theta = \sin^2\theta$

$\Leftrightarrow\ \tan^2\theta = 3$

$\Leftrightarrow\ \tan\theta = \pm\sqrt{3}$

$\therefore\ \theta = \frac{\pi}{3}$

$\therefore\ \left(\frac{3\sqrt{3}}{2}, \frac{\pi}{3}\right)$

$(0, 0)$

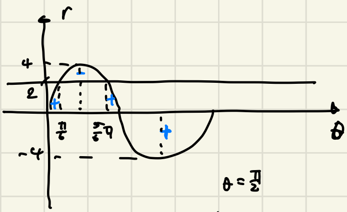
연습문제 11.3

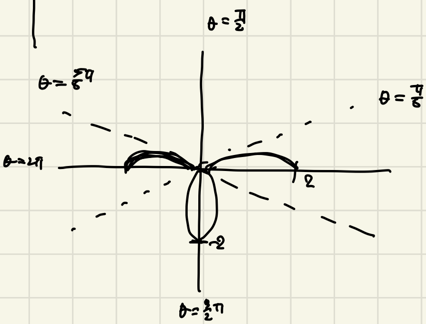
1-(3)

$r = 2 - 4\sin\theta$

$2 - 4\sin\theta = 0$

$\Leftrightarrow \sin\theta = \frac{1}{2}$





$$2 \times \frac{1}{2} \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (2 - 4\sin\theta)^2 \, d\theta$$

$$= \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (4 - 16\sin\theta + 16\sin^2\theta) \, d\theta$$

$$= [4\theta]_{-\frac{\pi}{2}}^{\frac{\pi}{2}} - 16[\sin\theta]_{-\frac{\pi}{2}}^{\frac{\pi}{2}} + 16[\sin^2\theta]_{-\frac{\pi}{2}}^{\frac{\pi}{2}}$$

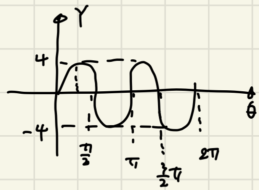
$$= 2\pi - (-2\pi) - 16|1 - (-1)| + 16(1 - 1)$$

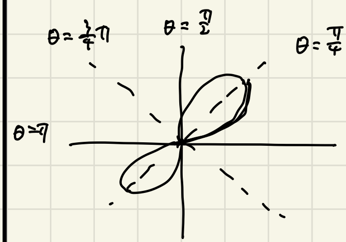
$$= 4\pi - 16(2)$$

(1)-5

$r^2 = 4\sin 2\theta$

$Y = 4\sin 2\theta$





$$A = \frac{1}{2} \int_0^{\frac{\pi}{2}} 4\sin 2\theta \, d\theta$$

$$= \frac{1}{2}\left[-\frac{4\cos 2\theta}{2} \right]_0^{\frac{\pi}{2}}$$

$$= \frac{1}{2}\left((-2\cos\pi) - (-2\cos(0)) \right)$$

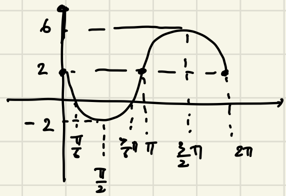
$$= [2 - (-2)] \frac{1}{2}$$

$$= 4 \times \frac{1}{2} = 2$$

$\therefore$ $2 \times 2 = 4$

$\therefore$ 4

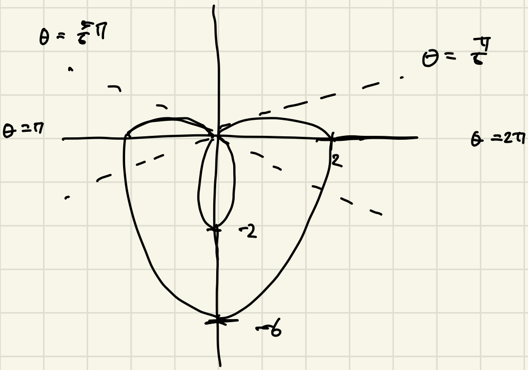
3. $r = 2-4\sin\theta$ 의 내부 넓이



$2-4\sin\theta = 0$

$\Leftrightarrow \sin\theta = \frac{1}{2}$

$\therefore \theta = \frac{\pi}{6}$



$$2 \times \frac{1}{2}\int_{-\frac{\pi}{2}}^{\frac{\pi}{3}} (2-4\sin\theta)^2 \, d\theta$$

$$= \int_{-\frac{\pi}{3}}^{\frac{\pi}{2}} (4 - 16\sin\theta + 16\sin^2\theta) \, d\theta$$

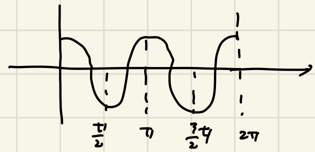
$$= [4\theta]_{-\frac{\pi}{3}}^{\frac{\pi}{2}} + 16[\cos\theta]_{-\frac{\pi}{2}}^{\frac{\pi}{2}} + 16\left[\frac{1-\cos 2\theta}{2}\right]_{-\frac{\pi}{2}}^{\frac{\pi}{2}}$$

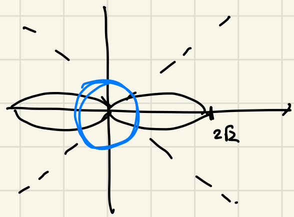
$$= 2\pi - \left(-\frac{\pi}{2}\right)\cdot 4 + 16[0-0] + 16[1-1]$$

$\Rightarrow 4\pi + 12\sqrt{3}$

6.

$r^2 = 8\cos 2\theta$





$\therefore 4\sqrt{3} - \frac{4}{3}\pi$

8-(1)

$$m = \frac{f(\theta)\cos\theta + f'(\theta)\sin\theta}{-f(\theta)\sin\theta + f'(\theta)\cos\theta}$$

$$= \frac{2\cos^2\theta - 2\sin^2\theta}{-2\cos\theta\sin\theta - 2\sin\theta\cos\theta}$$

$$= \frac{2\cos^2\theta - 2\sin^2\theta}{-4\sin\theta\cos\theta}$$

$$= \frac{2\cdot\left(\frac{1}{2}\right)^2 - 2\left(\frac{\sqrt{3}}{2}\right)^2}{-4\,\frac{\sqrt{3}}{2}\cdot\frac{1}{2}} = \frac{\sqrt{3}}{3}$$

8-(3)

$$m = \frac{f(\theta)\cos\theta + f'(\theta)\sin\theta}{-f(\theta)\sin\theta + f'(\theta)\cos\theta}$$

$$= \frac{\sin 2\theta\cos\theta + 2\cos 2\theta\sin\theta}{-\sin 2\theta\cos\theta + 2\cos 2\theta\cos\theta}$$

$$= \frac{\sin(\pi - \frac{2}{3}\pi)\cos\frac{1}{3}\pi + 2\cos(\pi - \frac{2}{3}\pi)\sin\frac{1}{3}\pi}{-\sin(\pi - \frac{2}{3}\pi)\cos\frac{1}{3}\pi + 2(\pi - \frac{2}{3}\pi)\cos\frac{1}{3}\pi}$$

$$= \frac{\sqrt{3}}{5}$$

9.

$$m = \frac{f(\theta)\cos\theta + f'(\theta)\sin\theta}{-f(\theta)\sin\theta + f'(\theta)\cos\theta}$$

$$= \frac{(1-2\sin\theta)(\cos\theta) + (2\cos\theta\sin\theta)}{-(1-2\sin\theta)\sin\theta + (-2\cos\theta)(\cos\theta)}$$

$$(1-2\sin\theta)(\cos\theta) + (-2\cos\theta)\sin\theta) = 0$$

$$-(1-2\sin\theta)\sin\theta + (-2\cos\theta)(\cos\theta) \neq 0$$

$\therefore$ $(-1, \pi/2)$, $(3, 3\pi/2)$,

$(1/2, \sin^{-1}(1/4))$, $(1/2, \pi-\sin^{-1}(1/4))$