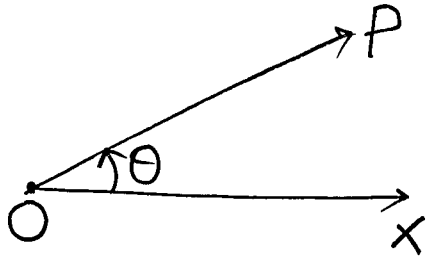
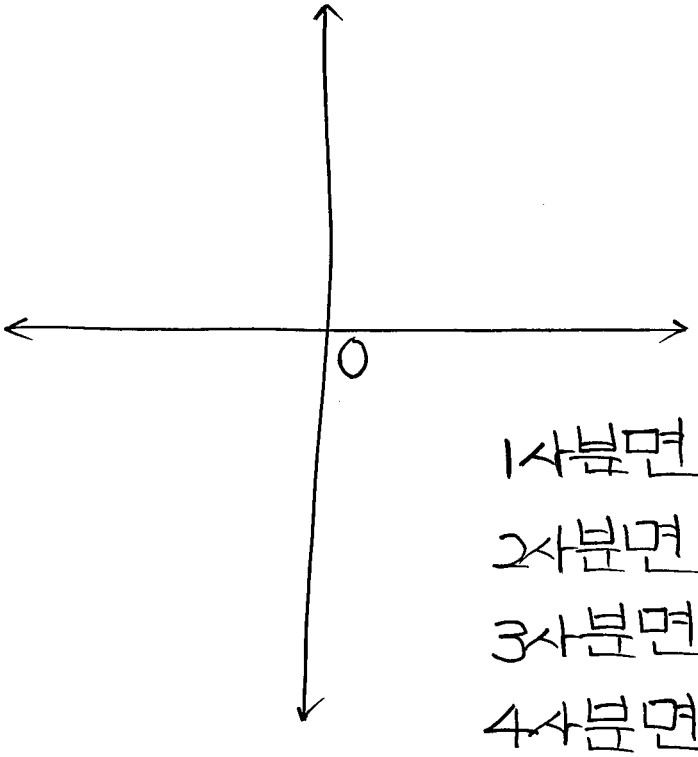
6. 삼각함수

P233



$\theta = 360^\circ \times n + \alpha \quad (0 \le \alpha < 360^\circ,\ n\text{은 정수})$



1사분면 : $360^\circ \times n < \theta < 360^\circ \times n + 90^\circ$

2사분면 : $360^\circ \times n + 90^\circ < \theta < 360^\circ \times n + 180^\circ$

3사분면 : $360^\circ \times n + 180^\circ < \theta < 360^\circ \times n + 270^\circ$

4사분면 : $360^\circ \times n + 270^\circ < \theta < 360^\circ \times n + 360^\circ$

P234.

EX) $410^\circ = 360^\circ \times 1 + 50^\circ$

일반각 : $360^\circ \times n + 50^\circ$

P235

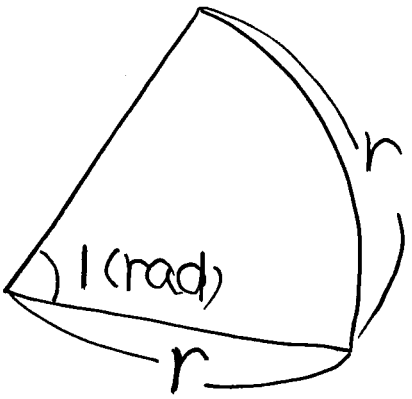
EX)

(1) $490^\circ = 360^\circ \times 1 + 130^\circ$ ∴ 제2사분면

(2) $-500^\circ = 360^\circ \times (-2) + 220^\circ$ ∴ 제3사분면

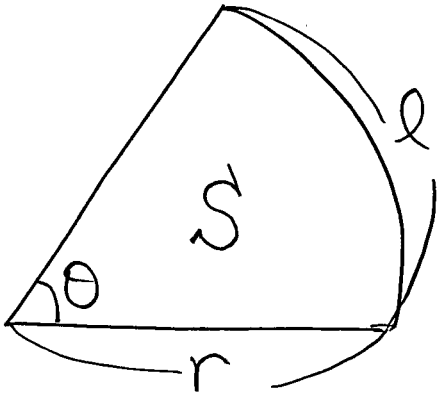
P236

2 호도법



$180^\circ = \pi$

$1^\circ = \frac{\pi}{180}$



$2\pi : 2\pi r = \theta : l$

$2\pi l = 2\pi r\theta$

$\boxed{l = r\theta}$

$2\pi : \pi r^2 = \theta : S$

$2\pi S = \pi r^2 \theta$

$\boxed{S = \frac{1}{2}r^2\theta = \frac{1}{2}rl}$

P237

EX1)

(1) $60^\circ = 60 \times \frac{\pi}{180} = \frac{\pi}{3}$

(2) $\frac{3}{4}\pi = \frac{3}{4} \times 180^\circ = 135^\circ$

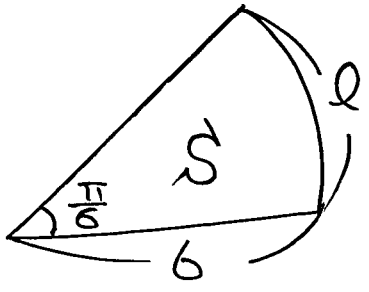
EX2)

(1) $13\pi = 2\pi \times 6 + \pi$ 일반각 : $2n\pi + \pi$ (n은정수)

(2) $-\frac{5}{3}\pi = 2\pi \times (-1) + \frac{\pi}{3}$ 일반각 : $2n\pi + \frac{\pi}{3}$ (n은정수)

P238

EX)



(1) $l = 6 \cdot \frac{\pi}{6} = \pi$

(2) $S = \frac{1}{2} \cdot 6^2 \cdot \frac{\pi}{6} = 3\pi$

P239

11

(1) $420^\circ = 360^\circ \times 1 + 60^\circ$ $\therefore 360^\circ \times n + 60^\circ$ (n은정수)

(2) $-330^\circ = 360^\circ \times (-1) + 30^\circ$ $\therefore 360^\circ \times n + 30^\circ$ (n은정수)

21

(1) $135^\circ = 135 \times \frac{\pi}{180} = \frac{3\pi}{4}$

(2) $-150^\circ = -150 \times \frac{\pi}{180} = -\frac{5\pi}{6}$

(3) $\frac{4\pi}{3} = \frac{4}{3} \times 180^\circ = 240^\circ$

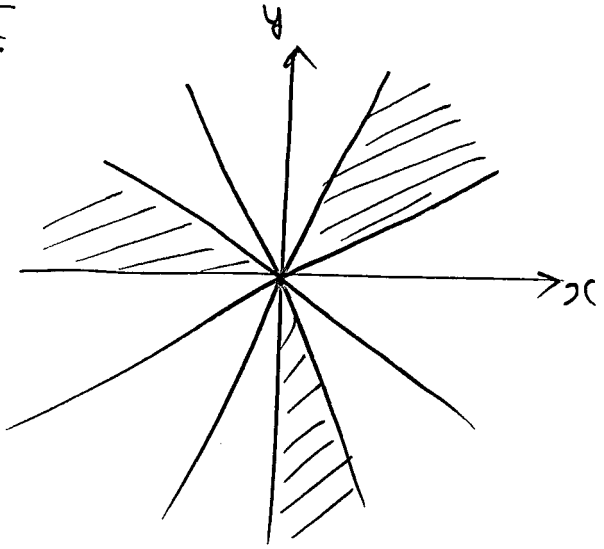
(4) $-\frac{5}{4}\pi = -\frac{5}{4} \times 180^\circ = -225^\circ$

(2) $\frac{2n\pi}{3}+\frac{\pi}{6}<\theta<\frac{2n\pi}{3}+\frac{\pi}{3}$

$n=0$; $\frac{\pi}{6}<\theta<\frac{\pi}{3}$

$n=1$; $\frac{5\pi}{6}<\theta<\pi$

$n=2$; $\frac{3\pi}{2}<\theta<\frac{5\pi}{3}$

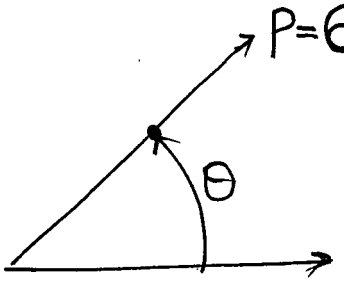


제1사분면 또는

제2사분면 또는 제4사분면

1-2)

(1)



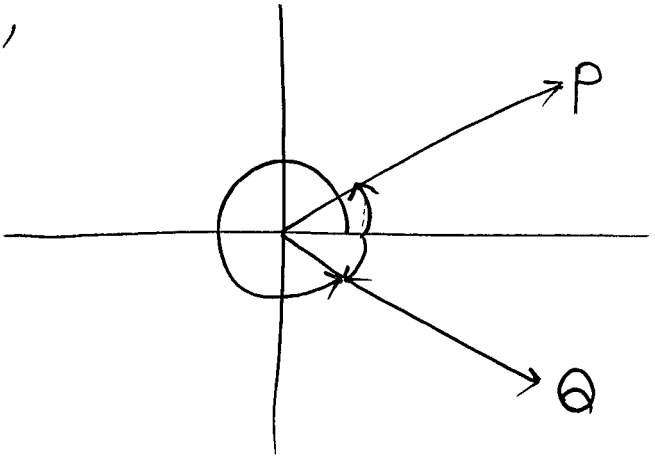
$4\theta-\theta=2n\pi$ (n은정수

$3\theta=360^\circ\times n$

$\theta=120^\circ\times n$

$90^\circ<\theta<180^\circ$ $n=1$; $\theta=120^\circ$

(2)



$\theta+4\theta=360^\circ\times n$

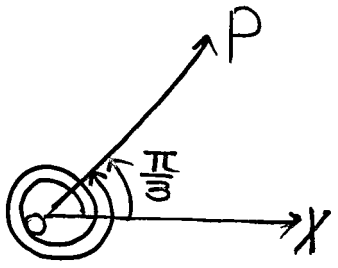
$\theta=72^\circ\times n$

$n=2$; $\theta=144^\circ$

3)

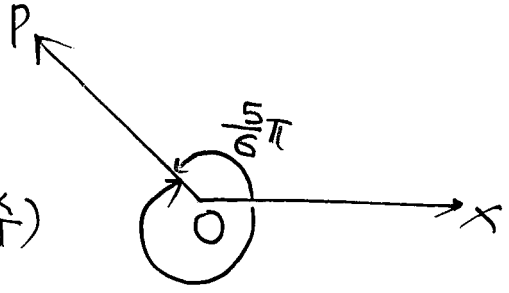
(1) $\frac{13}{3}\pi = 2\pi \times 2 + \frac{\pi}{3}$

$\therefore 2n\pi + \frac{\pi}{3}$ (n은정수)

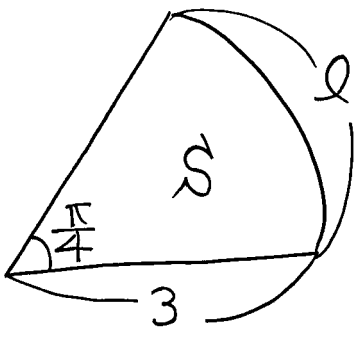


(2) $-\frac{7\pi}{6} = 2\pi \times (-1) + \frac{5\pi}{6}$

$\therefore 2n\pi + \frac{5}{6}\pi$ (n은정수)



4)



$l = 3 \times \frac{\pi}{4} = \frac{3\pi}{4}$

$S = \frac{1}{2} \cdot 9 \cdot \frac{\pi}{4} = \frac{9\pi}{8}$

P241

1-1)

(1) $2n\pi + \frac{\pi}{2} < \theta < 2n\pi + \pi$ (n은 정수)

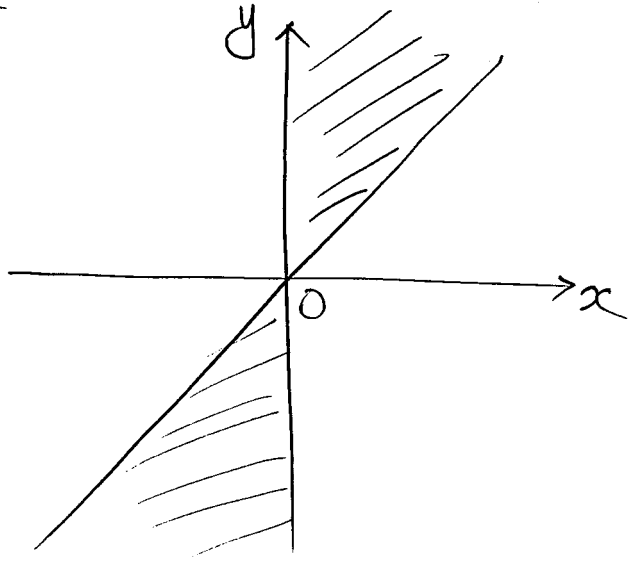
$n\pi + \frac{\pi}{4} < \frac{\theta}{2} < n\pi + \frac{\pi}{2}$

$n=0;\ \frac{\pi}{4} < \frac{\theta}{2} < \frac{\pi}{2}$

$n=1;\ \pi + \frac{\pi}{4} < \frac{\theta}{2} < \pi + \frac{\pi}{2}$

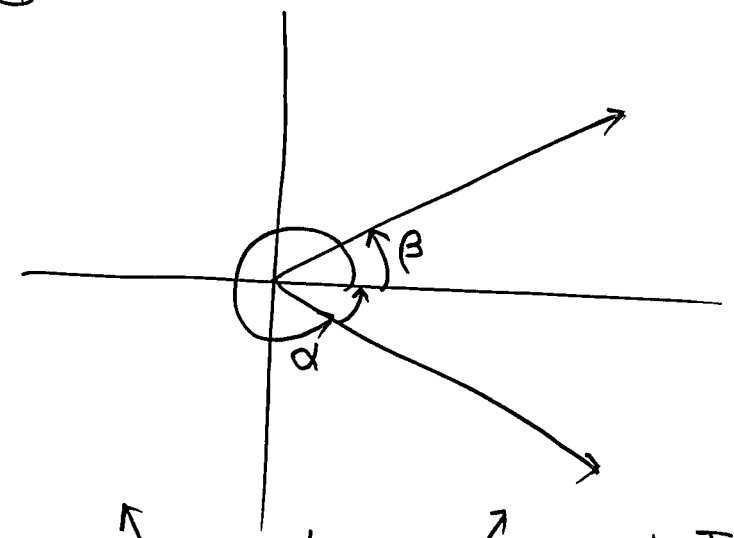
제1사분면 또는

제3사분면



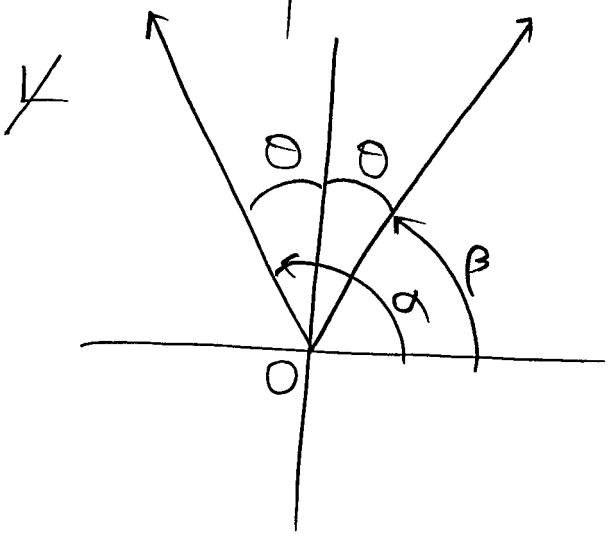
1-3

㉠



$\alpha+\beta=2n\pi$ (n은 정수)

㉡

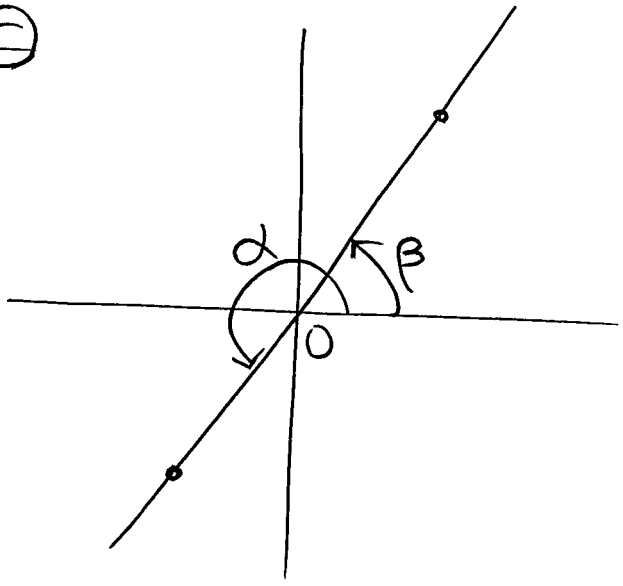


$\alpha=\frac{\pi}{2}+\theta$

$\beta=\frac{\pi}{2}-\theta$

$\alpha+\beta=2n\pi+\pi$ (n은 정수)

㉢

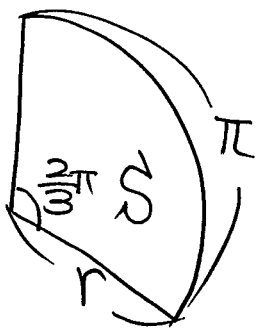


$\alpha-\beta=2n\pi+\pi$

(n은 정수)

2-1

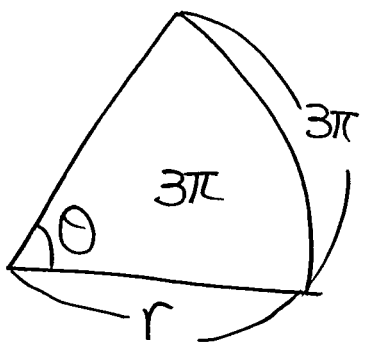
(1)



$\pi = r \times \frac{2}{3}\pi \qquad r = \frac{3}{2}$

$S = \frac{1}{2} \times \frac{9}{4} \times \frac{2}{3}\pi = \frac{3\pi}{4}$

(2)



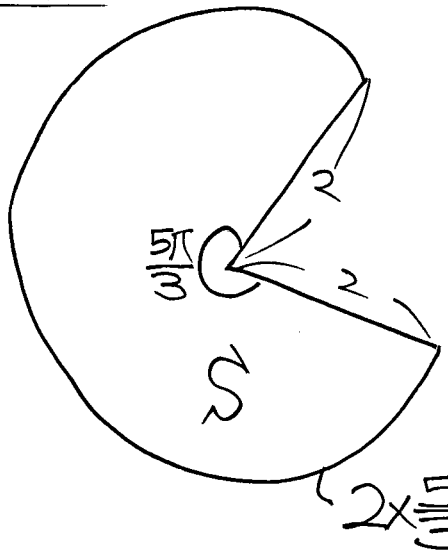
$3\pi = r\theta$

$3\pi = \frac{1}{2} \cdot r^2\theta$

$3\pi = \frac{1}{2} r \cdot r\theta = \frac{1}{2} r \cdot 3\pi$

$r = 2, \ \theta = \frac{3\pi}{2}$

2-2



$60^\circ = 60 \times \frac{\pi}{180} = \frac{\pi}{3}$

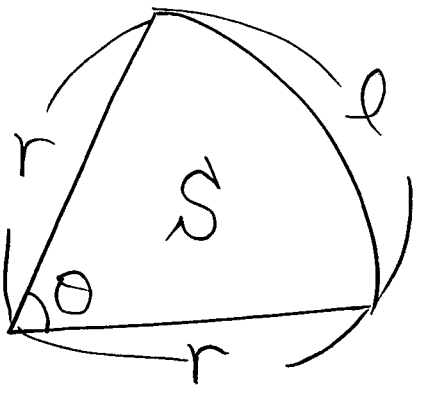
둘레의 길이 : $4 + \frac{10\pi}{3}$

$2 \times \frac{5\pi}{3} = \frac{10\pi}{3}$

$S = \frac{1}{2} \times 4 \times \frac{5\pi}{3}$

$= \frac{10\pi}{3}$

2-3)



$\ell = r\theta$

$S = \frac{1}{2}r^2\theta = \frac{1}{2}r\ell$

$\ell = \frac{2S}{r}$

(둘레의 길이) $= 2r + \ell = 2r + \frac{2S}{r}$

$\geq 2\sqrt{2r \cdot \frac{2S}{r}}$

$= 4\sqrt{S}$

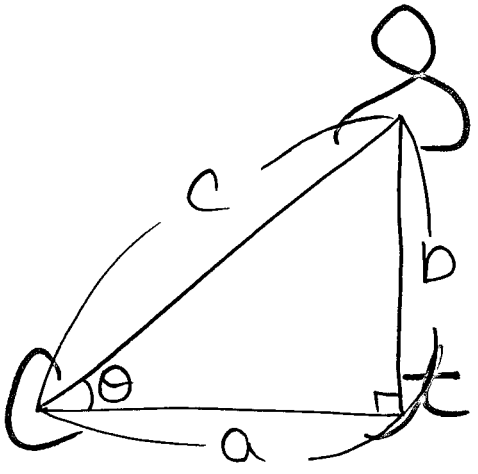
단 $2r = \frac{2S}{r}$

$S = r^2$ 일 때

∴ 등호성립

$r^2 = \frac{1}{2} \cdot r^2\theta$ $\boxed{\theta = 2}$

$\boxed{\text{최솟값} : 4\sqrt{S}}$



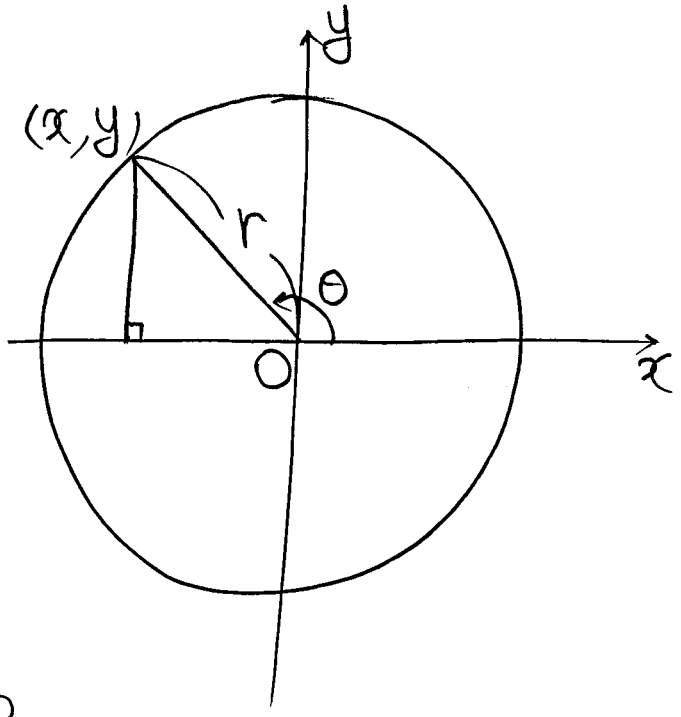
$\sin\theta = \frac{b}{c}$

$\cos\theta = \frac{a}{c}$

$\tan\theta = \frac{b}{a}$

$\tan\theta = \frac{\sin\theta}{\cos\theta}$

$\cos^2\theta + \sin^2\theta = 1$



$$\sin\theta = \frac{y}{r}$$

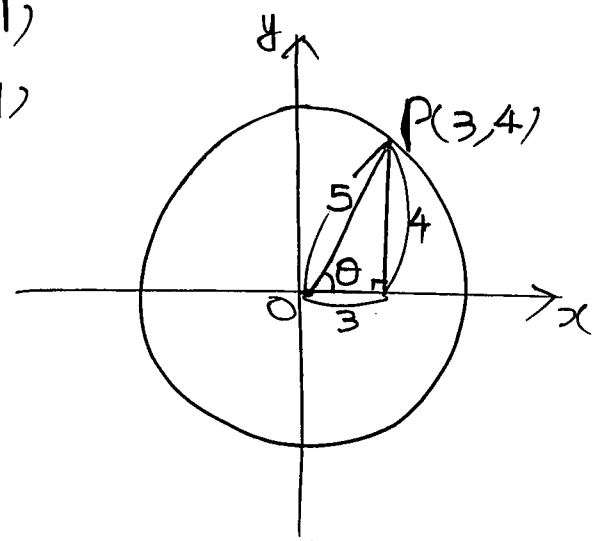
$$\cos\theta = \frac{x}{r}$$

$$\tan\theta = \frac{y}{x}$$

P245

EX1)

(1)

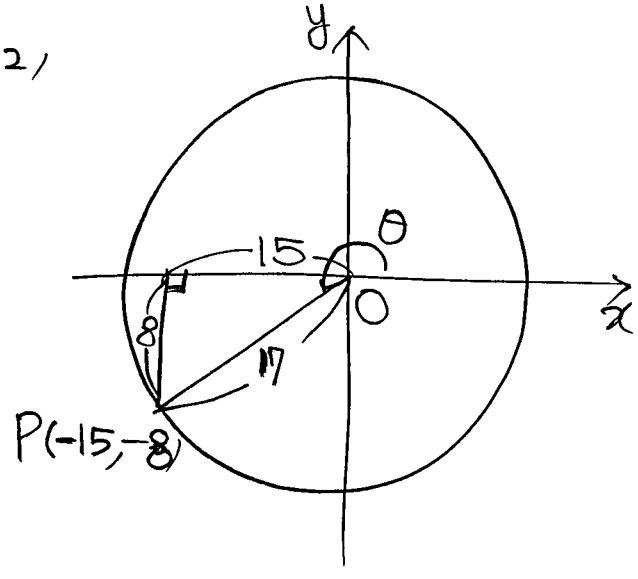


$$\sin\theta = \frac{4}{5}$$

$$\cos\theta = \frac{3}{5}$$

$$\tan\theta = \frac{4}{3}$$

(2)

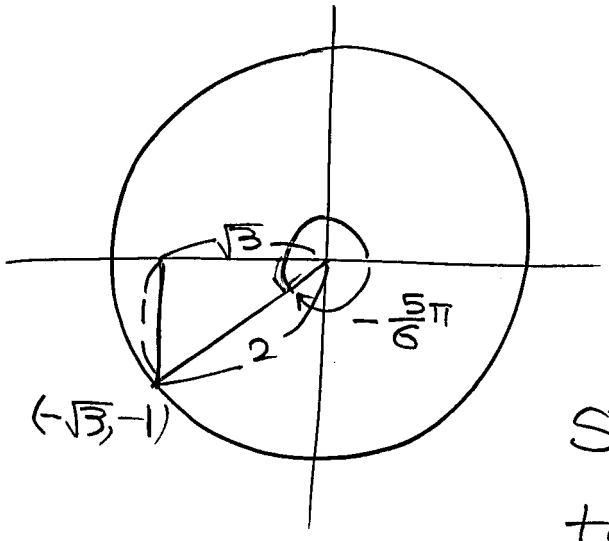


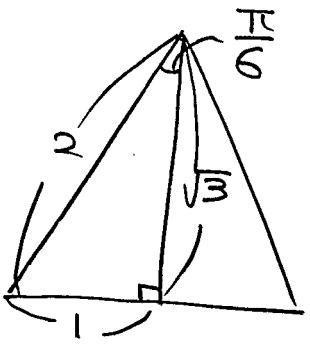
$$\sin\theta = \frac{-8}{17}$$

$$\cos\theta = \frac{-15}{17}$$

$$\tan\theta = \frac{8}{15}$$

EX21





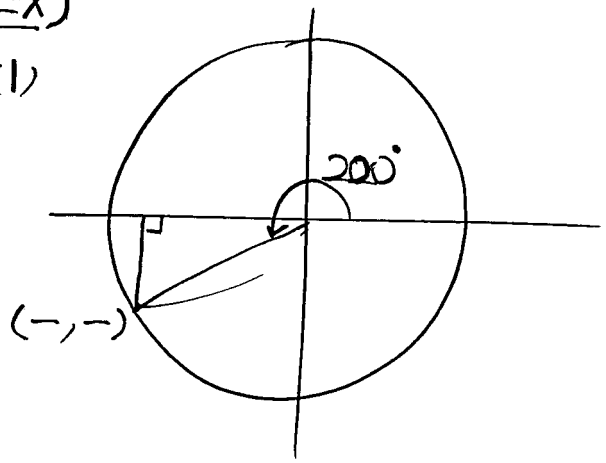
$\sin(-\frac{5\pi}{6}) = \frac{-1}{2}$, $\cos(-\frac{5\pi}{6}) = \frac{-\sqrt{3}}{2}$

$\tan(-\frac{5\pi}{6}) = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

P247

EX)

(1)

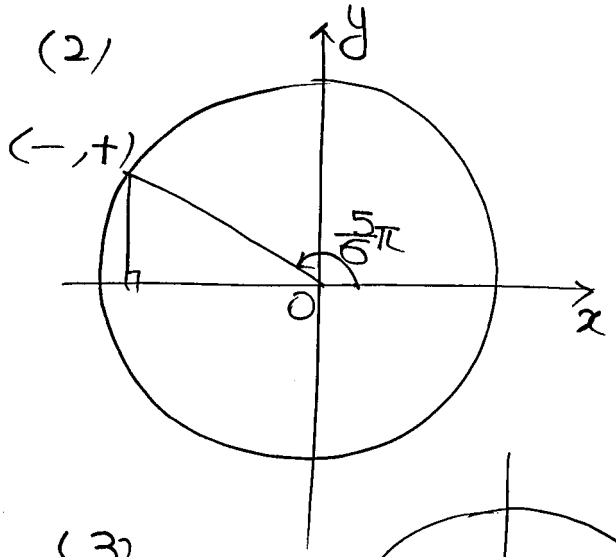


$\sin 200° < 0$

$\cos 200° < 0$

$\tan 200° > 0$

(2)

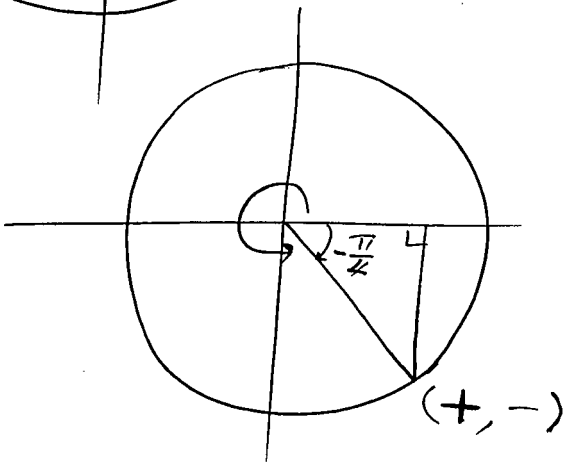


$\sin\frac{5\pi}{6} > 0$

$\cos\frac{5\pi}{6} < 0$

$\tan\frac{5\pi}{6} < 0$

(3)



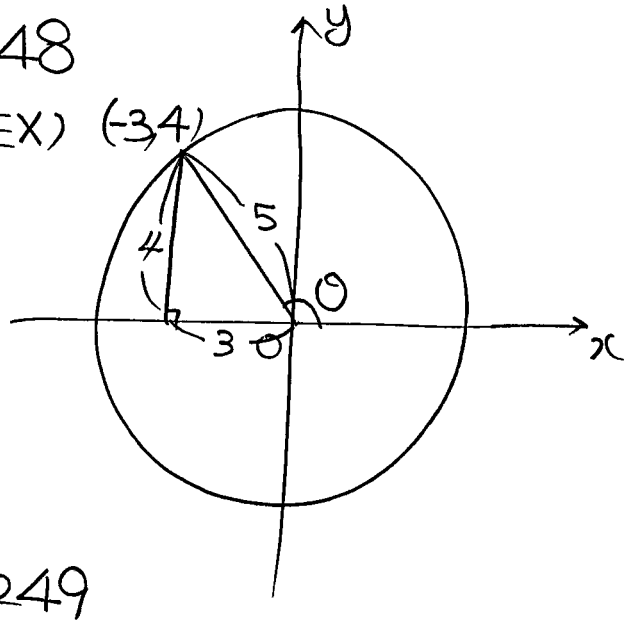
$\sin(-\frac{\pi}{4}) < 0$

$\cos(-\frac{\pi}{4}) > 0$

$\tan(-\frac{\pi}{4}) < 0$

P248

EX) (-3,4)

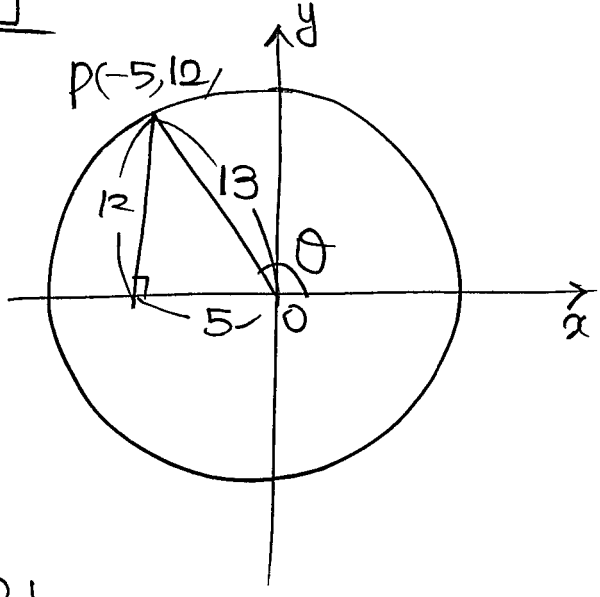


$\cos\theta = \frac{-3}{5}$

$\tan\theta = -\frac{4}{3}$

P249

II

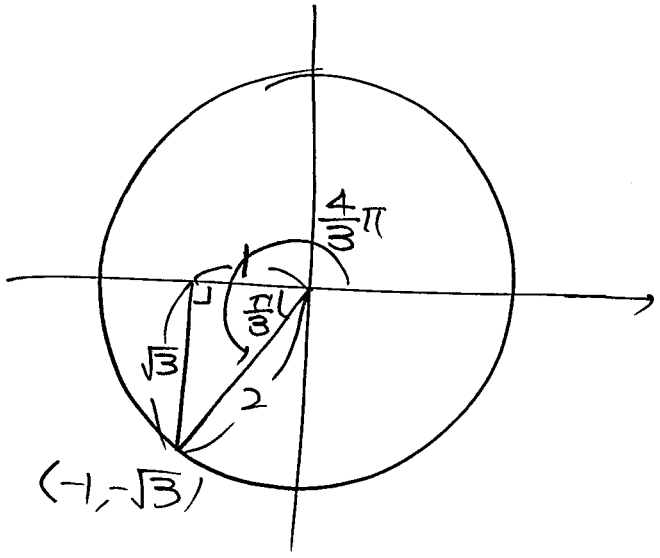


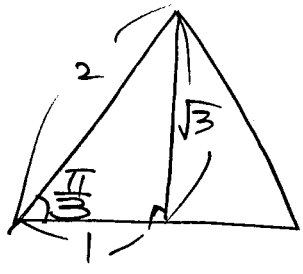
(1) $\sin\theta = \frac{12}{13}$

(2) $\cos\theta = \frac{-5}{13}$

(3) $\tan\theta = -\frac{12}{5}$

21





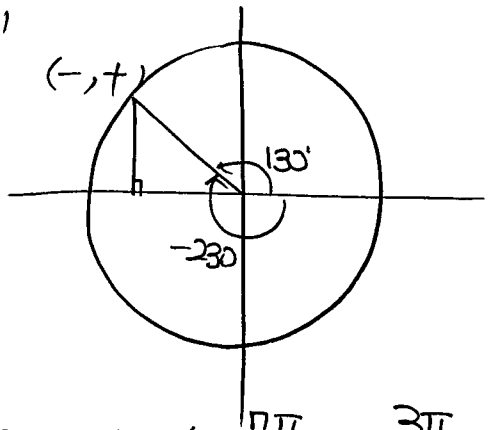
$\sin\frac{4\pi}{3} = -\frac{\sqrt{3}}{2}$

$\cos\frac{4\pi}{3} = -\frac{1}{2}$

$\tan\frac{4\pi}{3} = \sqrt{3}$

31

(1)

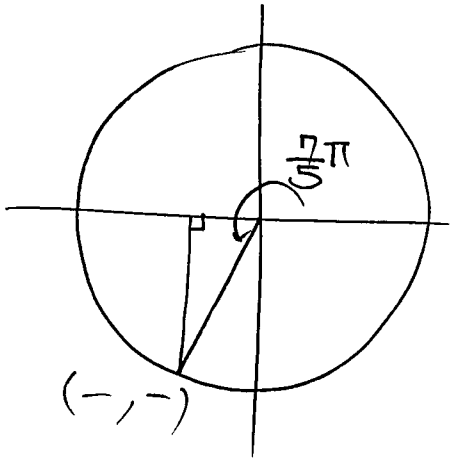


$\sin(-230^\circ) > 0$

$\cos(-230^\circ) < 0$

$\tan(-230^\circ) < 0$

(2) $\pi < \frac{7\pi}{5} < \frac{3\pi}{2}$

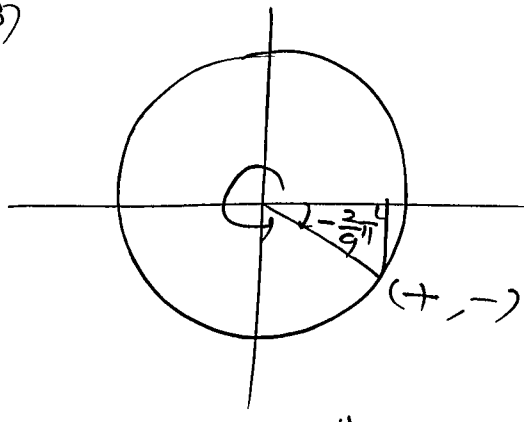


$\sin\frac{7\pi}{5} < 0$

$\cos\frac{7\pi}{5} < 0$

$\tan\frac{7\pi}{5} > 0$

(3)

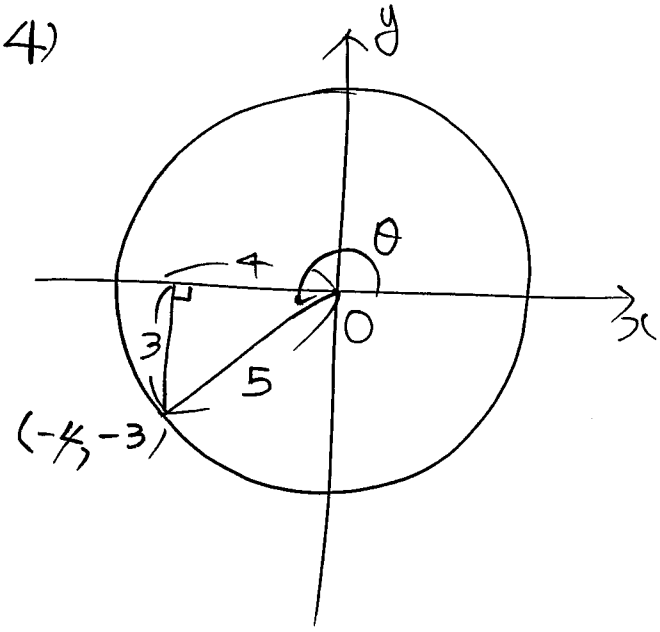


$\sin(-\frac{2\pi}{9}) < 0$

$\cos(-\frac{2\pi}{9}) > 0$

$\tan(-\frac{2\pi}{9}) < 0$

(4)



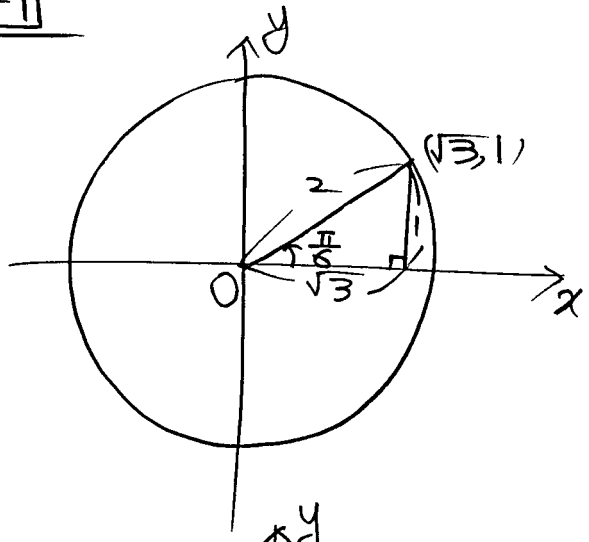
$\cos\theta = -\frac{4}{5}$

$\tan\theta = \frac{3}{4}$

P251

3-11

(1)

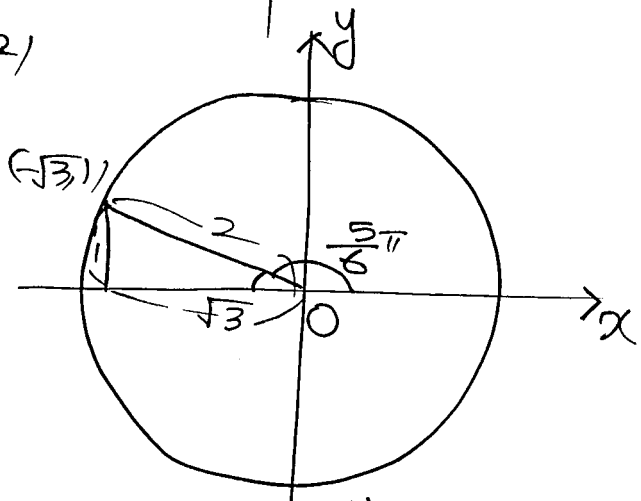


$\sin\frac{\pi}{6}=\frac{1}{2}$

$\cos\frac{\pi}{6}=\frac{\sqrt{3}}{2}$

$\tan\frac{\pi}{6}=\frac{\sqrt{3}}{3}$

(2)

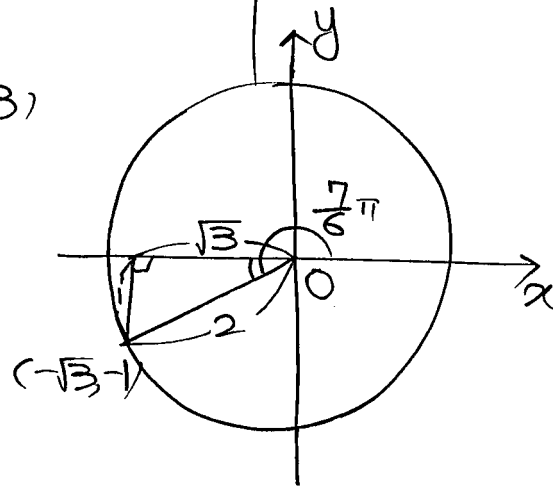


$\sin\frac{5\pi}{6}=\frac{1}{2}$

$\cos\frac{5\pi}{6}=-\frac{\sqrt{3}}{2}$

$\tan\frac{5}{6}\pi=-\frac{\sqrt{3}}{3}$

(3)

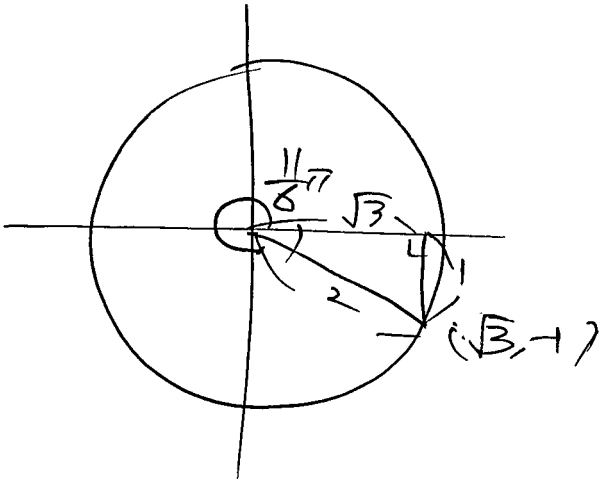


$\sin\frac{7\pi}{6}=-\frac{1}{2}$

$\cos\frac{7\pi}{6}=-\frac{\sqrt{3}}{2}$

$\tan\frac{7\pi}{6}=\frac{\sqrt{3}}{3}$

(4)

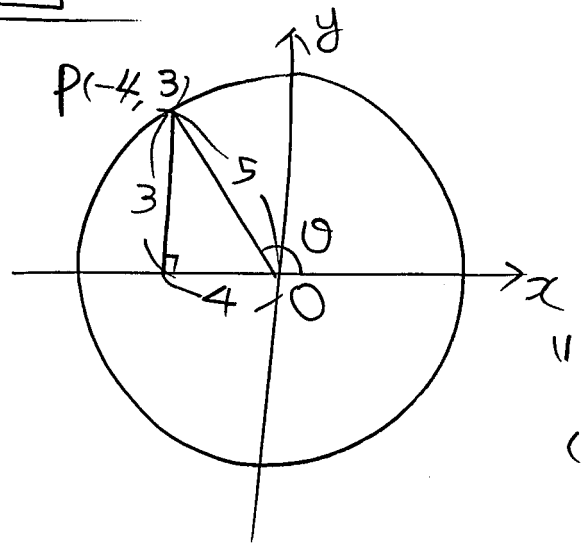


$\sin\frac{11}{6}\pi=-\frac{1}{2}$

$\cos\frac{11}{6}\pi=\frac{\sqrt{3}}{2}$

$\tan\frac{11}{6}\pi=\frac{\sqrt{3}}{3}$

3-2|



$\sin\theta = \frac{3}{5}$

$\cos\theta = -\frac{4}{5}$

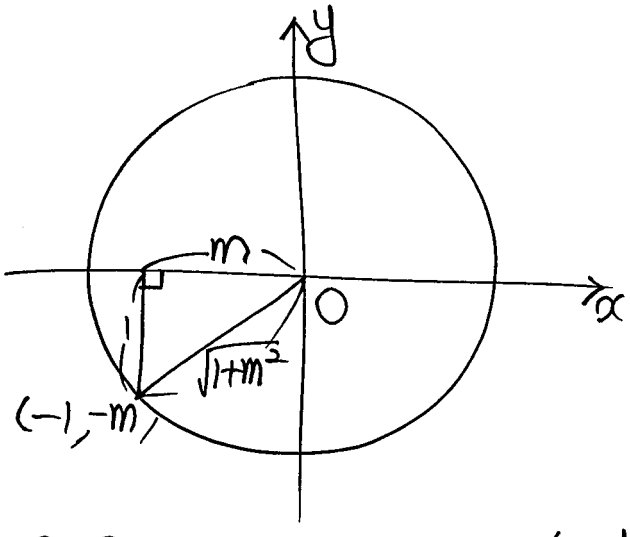
$\tan\theta = -\frac{3}{4}$

(1) $-\frac{4}{5}$

(2) $\frac{16}{25} + \frac{3}{5} = \frac{31}{25}$

(3) $\frac{3}{5} \cdot (-\frac{3}{4}) = -\frac{9}{20}$

3-3|



$m > 0$

$\sin\theta = -\frac{m}{\sqrt{1+m^2}}$

$\cos\theta = -\frac{1}{\sqrt{1+m^2}}$

$\sin\theta > 0$	$\sin\theta > 0$
$\cos\theta < 0$	$\cos\theta > 0$
$\tan\theta < 0$	$\tan\theta > 0$
$\sin\theta < 0$	$\sin\theta < 0$
$\cos\theta < 0$	$\cos\theta > 0$
$\tan\theta > 0$	$\tan\theta < 0$

4-1|

(1) 제2사분면

(2) 제3사분면

4-2|

㉠ ㉡ ㉣

4-3|

$\sin\theta < 0$, $\cos\theta < 0$

㉠ ㉡ ㉢

5-1

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

양변제곱 : $1 - 2\sin\theta\cos\theta = \frac{1}{2}$ ∴ $\sin\theta\cos\theta = \frac{1}{4}$

(2) $(\sin\theta+\cos\theta)^2 = 1 + 2\sin\theta\cos\theta = \frac{6}{4}$

$\sin\theta + \cos\theta = \frac{\sqrt{6}}{2}$ 또는 $-\frac{\sqrt{6}}{2}$

(3) $\sin^3\theta - \cos^3\theta = (\sin\theta-\cos\theta)(\sin^2\theta + \sin\theta\cos\theta + \cos^2\theta)$

$= \frac{\sqrt{2}}{2} \cdot \frac{5}{4} = \frac{5\sqrt{2}}{8}$

5-2

$\sin\theta > 0, \cos\theta > 0$, $\sin\theta\cos\theta = \frac{1}{4}$

(1) $(\sin\theta+\cos\theta)^2 = 1 + 2\sin\theta\cos\theta = \frac{6}{4}$

$\sin\theta + \cos\theta = \frac{\sqrt{6}}{2}$

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

$\sin\theta - \cos\theta = \frac{\sqrt{2}}{2}$ or $-\frac{\sqrt{2}}{2}$

(3) $\tan\theta + \frac{1}{\tan\theta} = \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta} = \frac{\sin^2\theta+\cos^2\theta}{\cos\theta \cdot \sin\theta}$

$= 4$

5-3 $-\frac{\sqrt{2}}{2}$

$\cos\theta - \sin\theta = \sqrt{2}\sin\theta\cos\theta$

$1 - 2\sin\theta\cos\theta = 2\sin^2\theta\cos^2\theta$ $\quad \sin\theta\cos\theta = t$

$2t^2 + 2t - 1 = 0$

$\sin^3\theta - \cos^3\theta = (\sin\theta-\cos\theta)(\sin^2\theta + \sin\theta\cos\theta + \cos^2\theta)$

$= -\sqrt{2}t(1+t) = -\sqrt{2} \times \frac{1}{2} = -\frac{\sqrt{2}}{2}$

6-1|

(1) $\tan^2\theta - \sin^2\theta$

$= \tan^2\theta - \tan^2\theta \cdot \cos^2\theta$

$= \tan^2\theta \cdot (1 - \cos^2\theta)$

$= \tan^2\theta \cdot \sin^2\theta$

$\tan\theta = \frac{\sin\theta}{\cos\theta}$

$\cos^2\theta + \sin^2\theta = 1$

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

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

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

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

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

6-2| ④

$(1-\tan\theta) = (2-\sqrt{3})(1+\tan\theta)$

$1 - \tan\theta = (2-\sqrt{3}) + (2-\sqrt{3})\tan\theta$

$(\sqrt{3}-1) = (3-\sqrt{3})\tan\theta$

$\tan\theta = \frac{\sqrt{3}-1}{3-\sqrt{3}} = \frac{(\sqrt{3}-1)}{\sqrt{3}(\sqrt{3}-1)} = \frac{\sqrt{3}}{3}$

(준식) $= \frac{\tan\theta \cdot \sin\theta}{\tan\theta - \sin\theta} - \frac{1}{\sin\theta}$

⑦

⑦ $\frac{1}{\frac{\tan\theta - \sin\theta}{\tan\theta \cdot \sin\theta}} = ??$

㉠ $\frac{\sin\theta}{1-\cos\theta}$

$\tan\theta - \sin\theta$
$= \tan\theta - \tan\theta\cdot\cos\theta$
$= \tan\theta\cdot(1-\cos\theta)$

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

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

$= \frac{\cos\theta\cdot(1-\cos\theta)}{(1-\cos\theta)\cdot\sin\theta} = \frac{\cos\theta}{\sin\theta} = \frac{1}{\tan\theta} = \sqrt{3}$

6-3)

ㄱ. $\frac{\sin\theta}{1+\cos\theta} + \frac{1}{\tan\theta}$

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

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

㉡ $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta}$

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

$= 2(1+\tan^2\theta)$

㉢ $\tan^2\theta + \cos^2\theta\cdot(1-\tan^4\theta)$

$= \tan^2\theta + \cos^2\theta\cdot(1+\tan^2\theta)(1-\tan^2\theta) = \tan^2\theta + 1 - \tan^2\theta = 1$

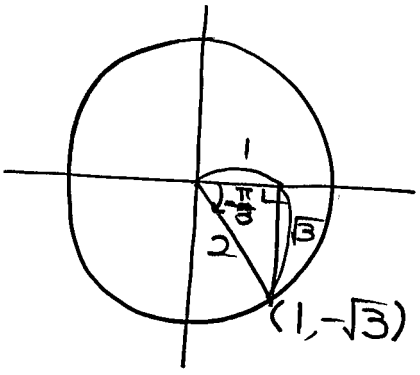
P258

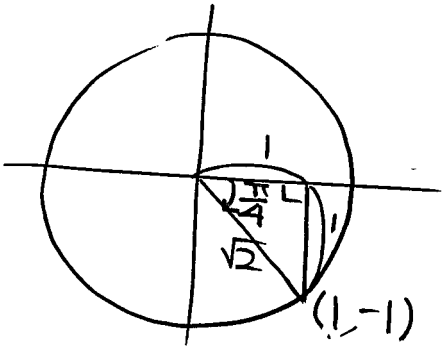
EX)

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

(2) $\cos(-\frac{\pi}{4}) = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

(3) $\tan(-\frac{\pi}{4}) = \frac{-1}{1} = -1$





P259

EX)

(1) $\sin(\pi - \frac{\pi}{6}) = \frac{1}{2}$

(2) $\cos(\pi + \frac{\pi}{3})$

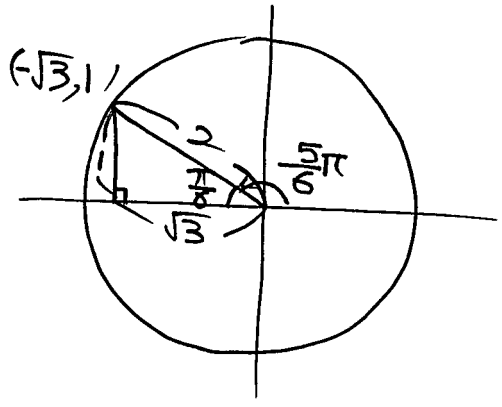
$= \cos\frac{4\pi}{3} = \frac{-1}{2}$

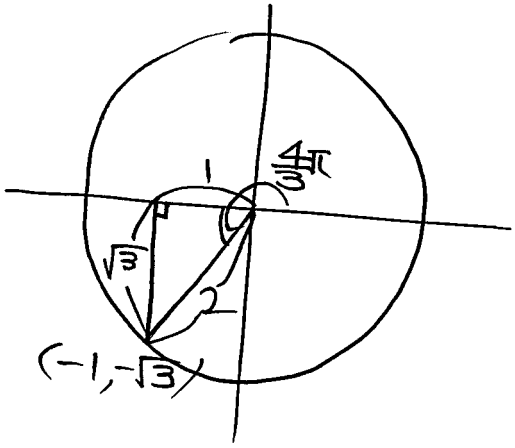
(3) $\tan(\pi - \frac{\pi}{4})$

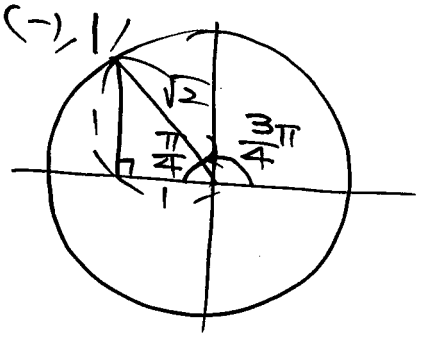
$= \tan\frac{3\pi}{4}$

$= \frac{1}{-1}$

$= -1$





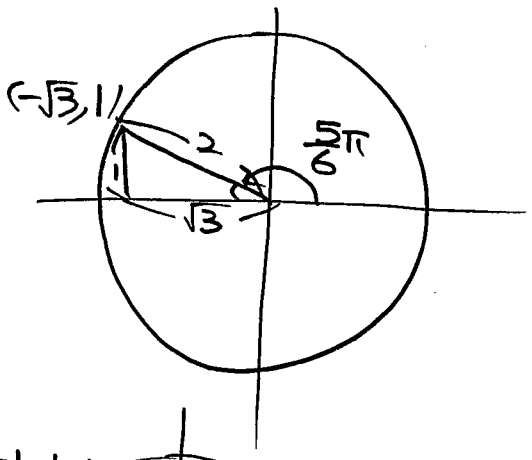


P260

EX) (1) $\sin\left(\frac{\pi}{2}+\frac{\pi}{3}\right)$

$=\sin\left(\frac{5\pi}{6}\right)$

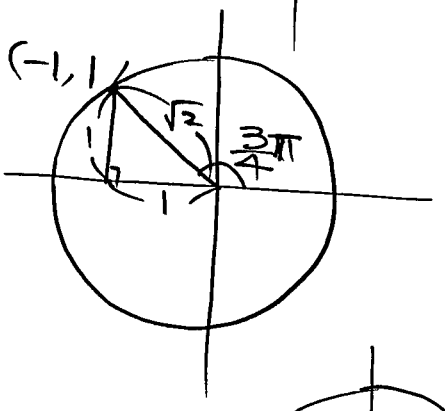
$=\frac{1}{2}$



(2) $\cos\left(\frac{\pi}{2}+\frac{\pi}{4}\right)$

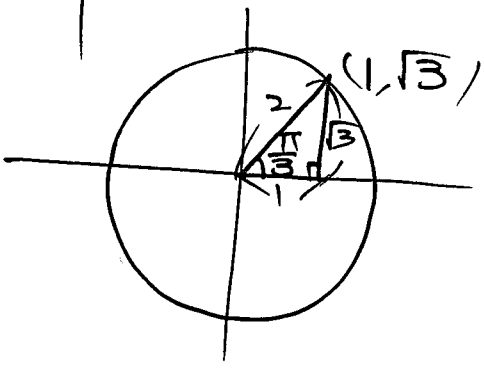
$=\cos\left(\frac{3\pi}{4}\right)$

$=\frac{-1}{\sqrt{2}}=\frac{-\sqrt{2}}{2}$



(3) $\tan\left(\frac{\pi}{2}-\frac{\pi}{6}\right)$

$=\tan\frac{\pi}{3}=\frac{\sqrt{3}}{1}=\sqrt{3}$



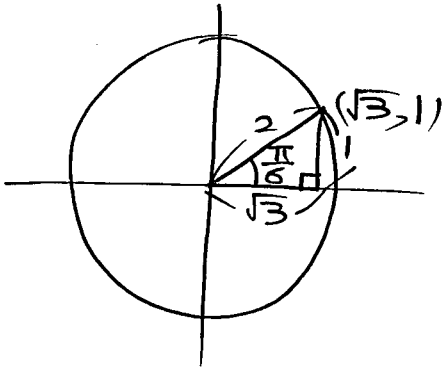
P261

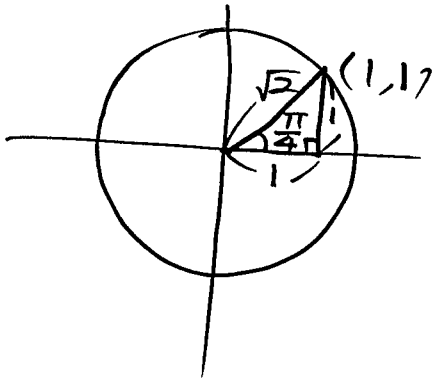
II

(1) $\sin\frac{7}{3}\pi=\sin\frac{\pi}{3}=\frac{\sqrt{3}}{2}$

(2) $\cos\frac{13\pi}{6}=\cos\frac{\pi}{6}=\frac{\sqrt{3}}{2}$

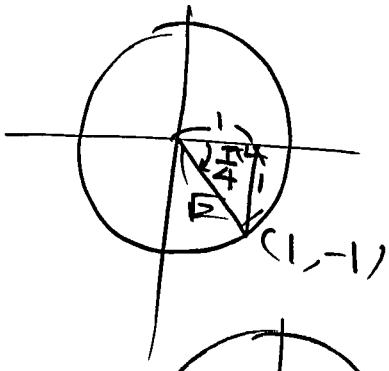
(3) $\tan\left(-\frac{7\pi}{4}\right)=\tan\frac{\pi}{4}=\frac{1}{1}=1$





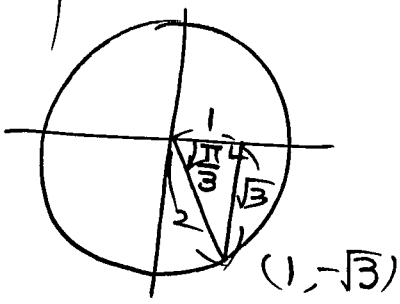
2)

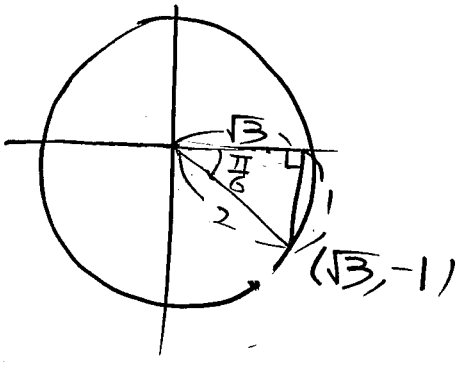
(1) $\sin(-\frac{\pi}{4}) = \frac{-1}{\sqrt{2}} = \frac{-\sqrt{2}}{2}$



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

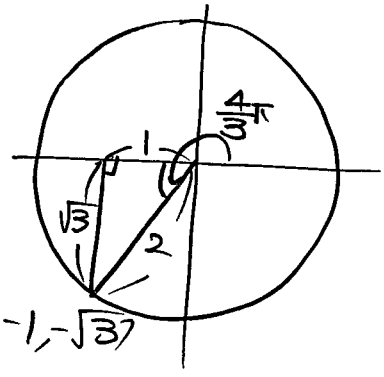
(3) $\tan(-\frac{\pi}{6}) = \frac{-1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$



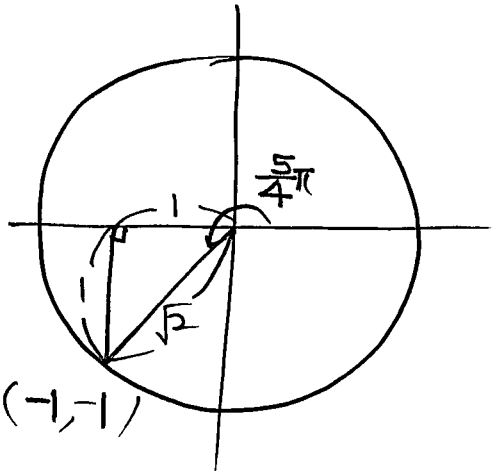


3)

(1) $\sin\frac{4\pi}{3} = \frac{-\sqrt{3}}{2}$



(2) $\cos\frac{5\pi}{4} = \frac{-1}{\sqrt{2}} = \frac{-\sqrt{2}}{2}$

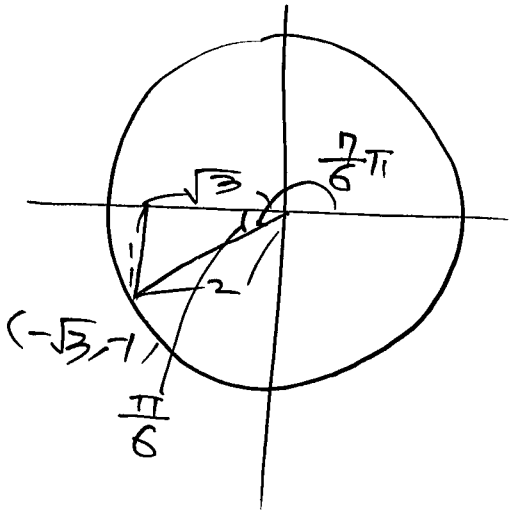


(3) $\tan(-\frac{5}{6}\pi)$

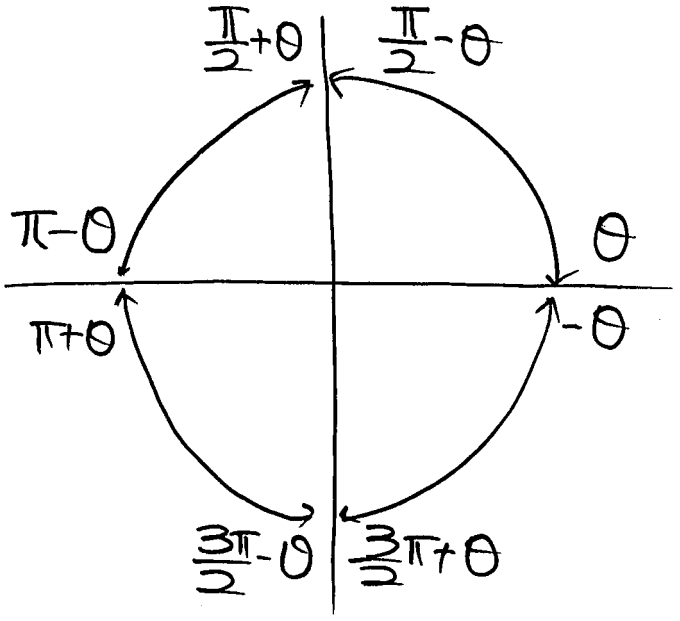
$= \tan(\frac{7\pi}{6})$

$= \frac{-1}{-\sqrt{3}}$

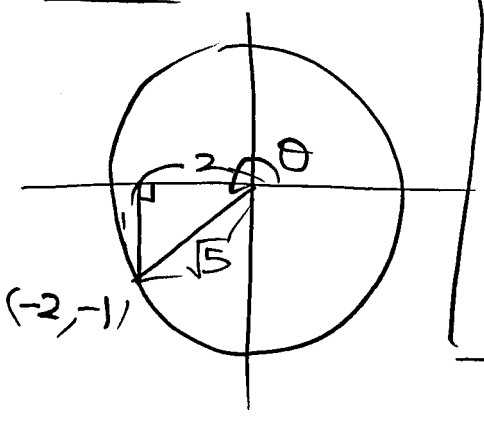
$= \frac{\sqrt{3}}{3}$



θ: 예각



7-1



$\sin\theta = \frac{-1}{\sqrt{5}} = \frac{-\sqrt{5}}{5}$

$\cos\theta = \frac{-2}{\sqrt{5}} = \frac{-2\sqrt{5}}{5}$

$\tan\theta = \frac{1}{2}$

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

(준식) $= -\cos\theta - \sin\theta = \frac{3\sqrt{5}}{5}$

(2) $\tan(\pi-\theta) = -\tan\theta$ $\tan(3\pi+\theta) = \tan(\pi+\theta)$

$= \tan\theta$

(준식) $= -\frac{1}{2} + 2 = \frac{3}{2}$

7-2)

(1) $\cos(\pi-\theta) = -\cos\theta$, $\sin(-\theta) = -\sin\theta$

$\cos(-\theta) = \cos\theta$, $\sin(\pi+\theta) = -\sin\theta$

(준식) $= \cos\theta\cdot\sin\theta + (-\cos\theta\cdot\sin\theta) = 0$

(2) $\sin(3\pi-\theta) = \sin(\pi-\theta) = \sin\theta$, $\sin(-\theta) = -\sin\theta$

$\cos(2\pi-\theta) = \cos(-\theta) = \cos\theta$, $\cos(\pi+\theta) = -\cos\theta$

(준식) $= -\sin^2\theta - \cos^2\theta = -1$

7-3)

(1) $\frac{\pi}{12} = \theta$ $\quad \pi = 12\theta$

(준식) $= \cos\theta + \cos 2\theta + \cdots + \cos 11\theta$

$= (\cos\theta + \cos 11\theta)$

$+ (\cos 2\theta + \cos 10\theta)$

$\vdots$

$+ (\cos 5\theta + \cos 7\theta)$

$+ \cos 6\theta$

$= \cos 6\theta = \cos\frac{\pi}{2} = 0$

$\cos 11\theta = \cos(\pi-\theta)$

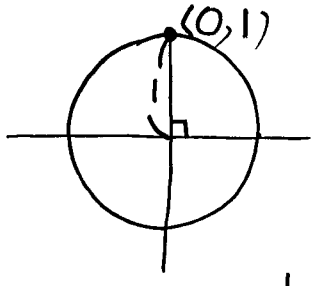
$= -\cos\theta$

$\cos\theta + \cos 11\theta = 0$

$\cos 10\theta = \cos(\pi-2\theta)$

$= -\cos 2\theta$

$\cos 2\theta + \cos 10\theta = 0$



(2) $\frac{\pi}{12} = \theta$, $\quad \pi = 12\theta$

(준식) $= \sin 0 + \sin\theta + \sin 2\theta + \cdots + \sin(23\theta)$

$= 0$

$\sin(13\theta)$

$= \sin(\pi+\theta)$

$= -\sin\theta$

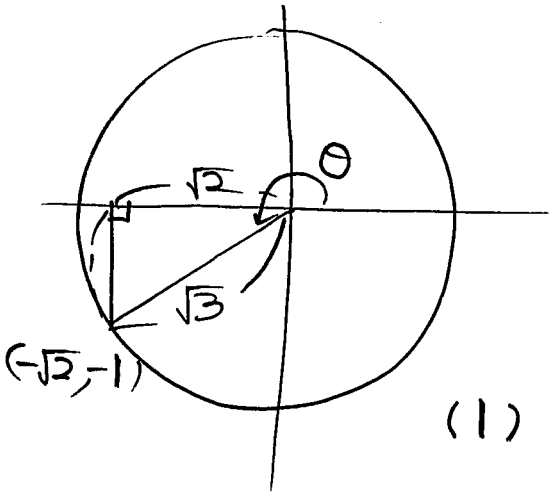
$\sin\theta + \sin 13\theta = 0$

$\sin 2\theta + \sin 14\theta = 0$

$\vdots$

$\sin 11\theta + \sin 23\theta = 0$

8-1



$\sin\theta = \frac{-1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$

$\cos\theta = \frac{-\sqrt{2}}{\sqrt{3}} = \frac{-\sqrt{6}}{3}$

$\tan\theta = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

(1) $\cos\left(\frac{3\pi}{2}+\theta\right) = \sin\theta$

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

(준식) $= \frac{-\sqrt{3}-\sqrt{6}}{3}$

(2) $\tan\left(\frac{\pi}{2}-\theta\right) = \frac{1}{\tan\theta}$, $\tan\left(\frac{\pi}{2}+\theta\right) = \frac{1}{-\tan\theta}$

(준식) $= \frac{1}{\tan\theta} - \tan\theta = \sqrt{2} - \frac{\sqrt{2}}{2} = \frac{\sqrt{2}}{2}$

8-2

(1) $\sin\left(\frac{\pi}{2}+\theta\right) = \cos\theta$, $\cos\left(\frac{\pi}{2}-\theta\right) = \sin\theta$

$\tan\left(\frac{\pi}{2}-\theta\right) = \frac{1}{\tan\theta} = \frac{\cos\theta}{\sin\theta}$

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

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

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

$= \frac{1}{\cos\theta}$

(2) $\sin\left(\frac{3\pi}{2}-\theta\right)=-\cos\theta$, $\cos\left(\frac{\pi}{2}+\theta\right)=-\sin\theta$

$\sin\left(\frac{3\pi}{2}+\theta\right)=-\cos\theta$ $\cos\left(\frac{\pi}{2}-\theta\right)=\sin\theta$

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

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

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

8-31

(1) $\frac{\pi}{8}=\theta$ $\frac{\pi}{2}=4\theta$

$(\text{준식})=\cos^2\theta+\cos^2 2\theta+\cdots\cdots+\cos^2 7\theta=3$

(08) $\cos 5\theta=\cos\left(\frac{\pi}{2}+\theta\right)=-\sin\theta$

$\cos^2\theta+\cos^2 5\theta=\cos^2\theta+\sin^2\theta=1$

$\cos 6\theta=\cos\left(\frac{\pi}{2}+2\theta\right)=-\sin 2\theta$

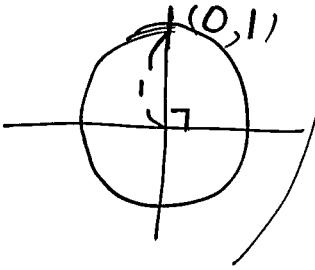
$\cos^2 2\theta+\cos^2 6\theta=\cos^2 2\theta+\sin^2 2\theta=1$

$\cos 7\theta=\cos\left(\frac{\pi}{2}+3\theta\right)=-\sin 3\theta$

$\cos^2 3\theta+\cos^2 7\theta=\cos^2 3\theta+\sin^2 3\theta=1$

$\cos 4\theta=\cos\frac{\pi}{2}=0$

$\cos^2 4\theta=0$



(2) $\frac{\pi}{16}=\theta \qquad \frac{\pi}{2}=8\theta$

(준식) $=\sin^2\theta+\sin^2 2\theta+\cdots+\sin^2 15\theta=8$

(쌍)

$\sin 9\theta=\sin\left(\frac{\pi}{2}+\theta\right)=\cos\theta$

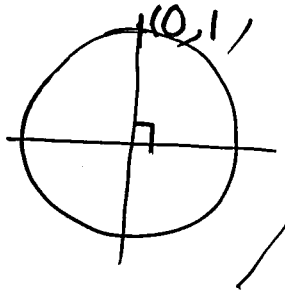
$\sin^2\theta+\sin^2 9\theta=\sin^2\theta+\cos^2\theta=1$

$\sin^2 2\theta+\sin^2 10\theta=\sin^2 2\theta+\cos^2 2\theta=1$

$\vdots$

$\sin^2 7\theta+\sin^2 15\theta=\sin^2 7\theta+\cos^2 7\theta=1$

$\sin^2 8\theta=\sin^2\frac{\pi}{2}=1$



B66

6-11

(1) $7\theta-\theta=6\theta=2n\pi$ (n은 정수)

$\theta=\frac{n\pi}{3}$; $0<\frac{n\pi}{3}<\frac{\pi}{2}$

$\boxed{\theta=\frac{\pi}{3}}$ $\qquad 0<n<\frac{3}{2}$ $\qquad n=1$

(2) $5\theta-\theta=4\theta=2n\pi+\pi$

$\theta=\frac{(2n+1)\pi}{4}$ (n은 정수)

$\frac{\pi}{2}<\theta<\pi$

$\frac{1}{2}<\frac{2n+1}{4}<1$

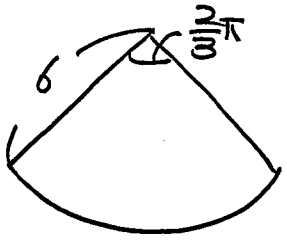
$2<2n+1<4$

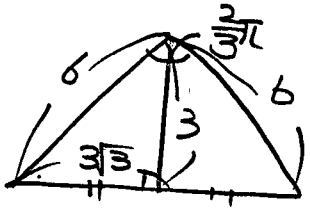
$\frac{1}{2}<n<\frac{3}{2}$

$n=1$

$\boxed{\theta=\frac{3\pi}{4}}$

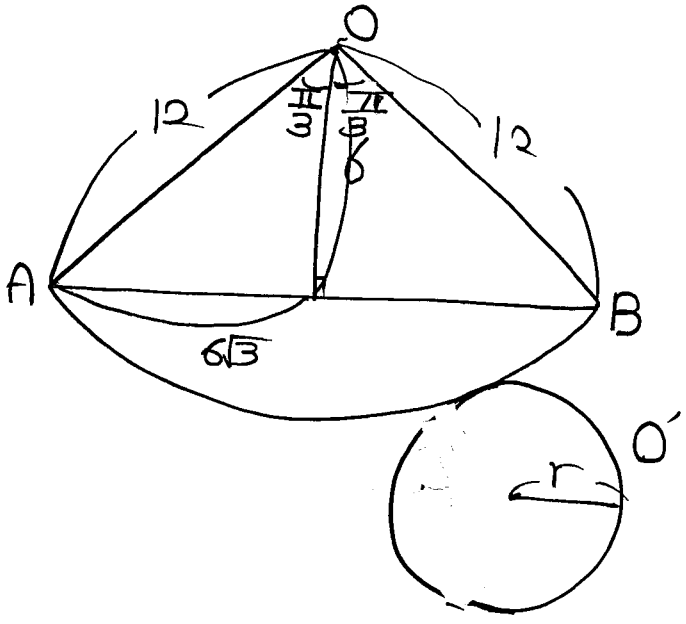
6-2)

$S =$ 

$-$ 

$= \frac{1}{2} \cdot 6^2 \cdot \frac{2\pi}{3} - \frac{1}{2} \cdot 6\sqrt{3} \cdot 3 = 12\pi - 9\sqrt{3}$

6-3) 4

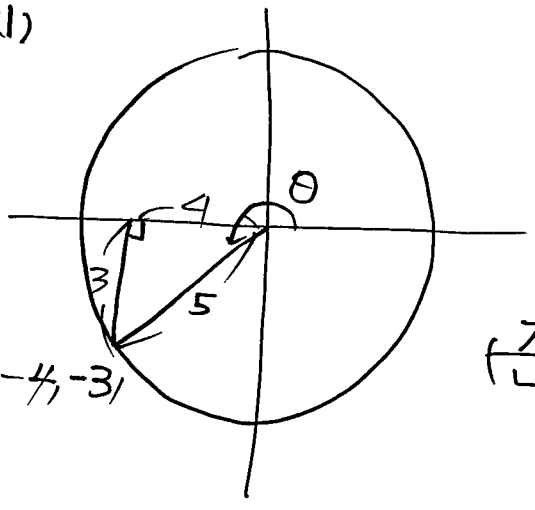


$12 \cdot \frac{2\pi}{3} = 2\pi \cdot r$

$r = 4$

6-4)

(1)



$\sin\theta = \frac{-3}{5}$, $\cos\theta = \frac{-4}{5}$

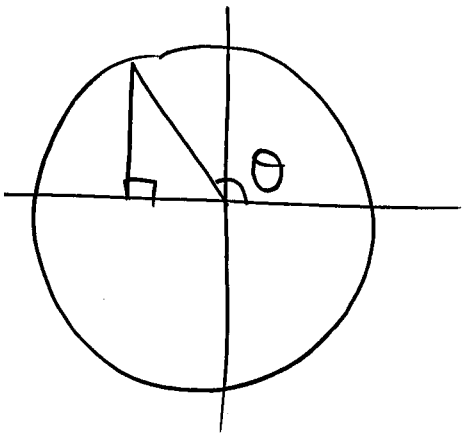
$\tan\theta = \frac{-3}{-4} = \frac{3}{4}$

(준식) $= 5 \cdot (-\frac{4}{5}) + 8 \cdot \frac{3}{4}$

$= -4 + 6$

$= 2$

(2)



$\sin\theta > 0,\ \cos\theta < 0$

$(\sin\theta - \cos\theta)^2 = 1 - 2\sin\theta\cos\theta$

$= \frac{6}{4}$

$\sin\theta - \cos\theta = \frac{\sqrt{6}}{2}$

$\sin^3\theta - \cos^3\theta = (\sin\theta - \cos\theta)(\sin^2\theta + \sin\theta\cos\theta + \cos^2\theta)$

$= \frac{\sqrt{6}}{2} \cdot \frac{3}{4} = \frac{3\sqrt{6}}{8}$

6-5 | ⑤

$\sin\theta > 0,\ \cos\theta < 0$

$(\sin\theta - \cos\theta)^2 = \sin^2\theta - 2\sin\theta\cos\theta + \cos^2\theta$

(°o°) $(\sin\theta + \cos\theta)^2 = \sin^2\theta + 2\sin\theta\cos\theta + \cos^2\theta$

$= 1 + 2\sin\theta\cos\theta = a^2$

$2\sin\theta\cos\theta = a^2 - 1$

$(\sin\theta - \cos\theta)^2 = 1 - (a^2 - 1)$

$= 2 - a^2$

$\sin\theta - \cos\theta = \sqrt{2 - a^2}$

6-6 $\frac{39}{16}$

$\sin\theta+\cos\theta=\frac{1}{3}$

$1+2\sin\theta\cos\theta=\frac{1}{9}$

$\sin\theta\cos\theta=-\frac{4}{9}$

(준식) $=\frac{1}{\cos\theta}\left(\frac{\sin\theta}{\cos\theta}+\frac{\cos^2\theta}{\sin^2\theta}\right)$

$=\frac{1}{\cos\theta}\left(\frac{\sin^3\theta+\cos^3\theta}{\cos\theta\cdot\sin^2\theta}\right)$

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

$=\frac{1}{3}\cdot\left(1+\frac{4}{9}\right)\cdot\frac{81}{16}=\frac{13}{\cancel{27}}\cdot\frac{\overset{3}{\cancel{81}}}{16}=\frac{39}{16}$

6-7 -7

$x^2+ax+b=0$ 두근 $\sin\theta,\cos\theta$

$\begin{cases}\sin\theta+\cos\theta=-a=\frac{1}{2}\\ \sin\theta\cdot\cos\theta=b\end{cases}$

$1+2\sin\theta\cos\theta=\frac{1}{4}$

$\sin\theta\cos\theta=-\frac{3}{8}$

$a=-\frac{1}{2}$

$8(a+b)=-7$

6-8

$\cos(\pi-\theta)=-\cos\theta$

① $\sin\left(\frac{3\pi}{2}-\theta\right)=-\cos\theta$

✗ $\cos(2\pi-\theta)=\cos(-\theta)=\cos\theta$

✗ $\cos\left(\frac{3\pi}{2}+\theta\right)=\sin\theta$

② $\cos(\pi+\theta)=-\cos\theta$

6-9

(1) $\sin(-\theta) = -\sin\theta$, $\sin(\pi-\theta) = \sin\theta$

$\cos(-\theta) = \cos\theta$ $\cos(5\pi+\theta) = \cos(\pi+\theta) = -\cos\theta$

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

$= 1 - \sin^2\theta - \cos^2\theta = 0$

(2) $\cos(\pi+\theta) = -\cos\theta$, $\tan(-\theta) = -\tan\theta$

$\sin(-\theta) = -\sin\theta$ $\tan(\pi+\theta) = \tan\theta$

(좌식) $= \cos^2\theta \cdot (-\tan\theta) + \dfrac{\sin^2\theta}{\tan\theta}$

$= -\cos\theta\sin\theta + \cos\theta\sin\theta = 0$

6-10

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

$\tan\left(\frac{3\pi}{2}-\theta\right) = \dfrac{1}{\tan\theta} = \dfrac{\cos\theta}{\sin\theta}$

(좌식) $= \dfrac{\sin\theta}{1+\cos\theta} + \dfrac{\cos\theta}{\sin\theta}$

$= \dfrac{\sin^2\theta + \cos\theta + \cos^2\theta}{(1+\cos\theta)\cdot\sin\theta}$

$= \dfrac{1}{\sin\theta}$

(2) $\cos\left(\frac{\pi}{2}+\theta\right)=-\sin\theta$, $\tan\left(\frac{\pi}{2}-\theta\right)=\frac{1}{\tan\theta}$

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

(준식) $=\sin^2\theta\cdot\frac{\cos\theta}{\sin\theta}+\cos^2\theta\cdot\frac{\sin\theta}{\cos\theta}$

$=2\sin\theta\cos\theta$

6-11) 180°

$\theta+110=120=360°\times n$ (n은정수, $0°<\theta<180°$)

$\theta=30°\times n$

$0°<30°\times n<180°$

$0<n<6$

$n=1$; $\alpha=30°$

$n=5$; $\beta=150°$

$\alpha+\beta=180°$

6-12) ①

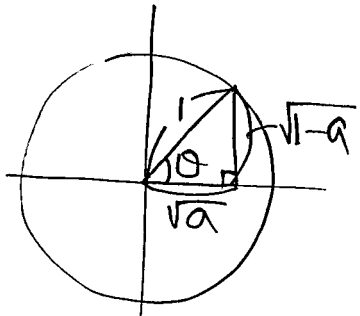
$\tan\theta=\frac{\sqrt{1-a}}{\sqrt{a}}$

(준식) $=\frac{\sin^2\theta\cdot(a-\cos\theta+a\cos\theta)}{a^2-\cos^2\theta}$

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

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

$=-2$



$\sin^2\theta=1-a$

$\cos^2\theta=a$

6-13| ②

$x^2+x+k=0$

$2\sin\theta=-1$

$\sin^2\theta-\cos^2\theta=k$

$k=-\frac{1}{2}$

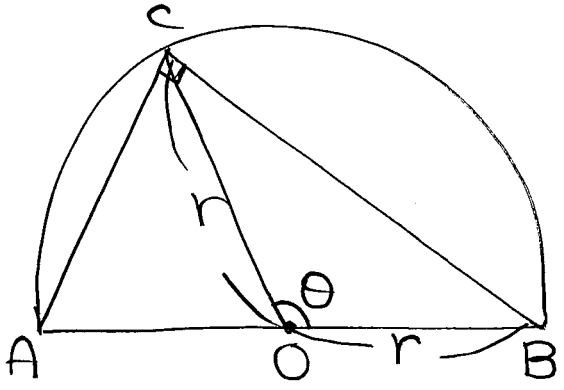
두근

$\sin\theta+\cos\theta$, $\sin\theta-\cos\theta$

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

$\sin^2\theta=\frac{1}{4}$, $\cos^2\theta=\frac{3}{4}$

6-14| ⑤



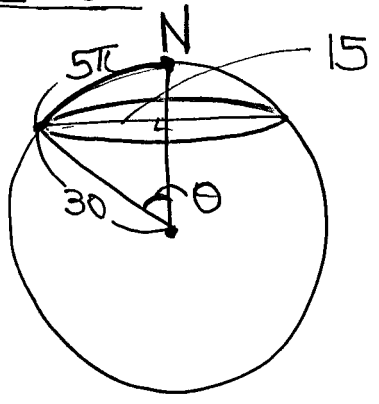
$\triangle ABC=\frac{1}{2}\cdot r^2\cdot\sin\theta\cdot 2=r^2\sin\theta$

$\triangle BOC=\frac{1}{2}\cdot r^2\cdot\theta$

$\frac{1}{2}r^2\theta=r^2\sin\theta$

$\theta=2\sin\theta$

6-15| 30π

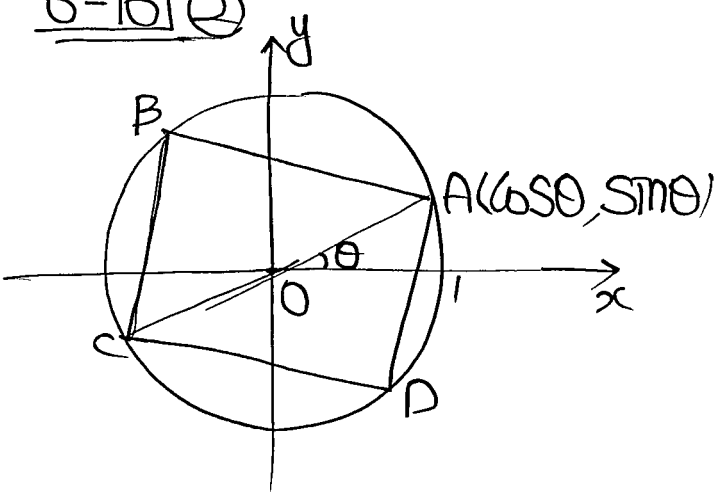


$30\cdot\theta=5\pi$

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

$l=30\cdot\pi$

6-16| ②



$\cos(\pi-\theta)=-\cos\theta$

6-17 ③

$\frac{\pi}{2} < \theta < \pi$; $\sin\theta > 0$, $\cos\theta < 0$

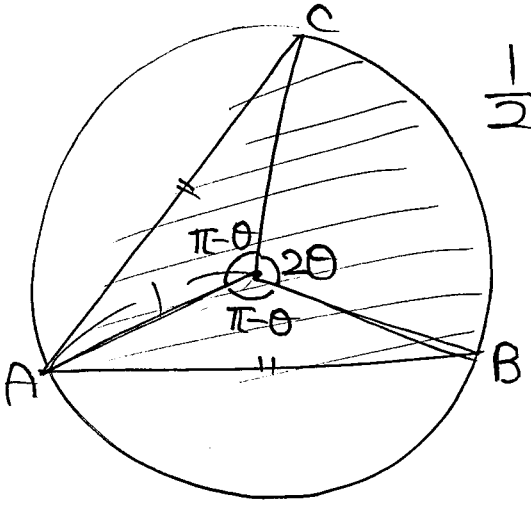
(준식) $= |1+\sin(\pi-\theta)| + |\cos(3\pi+\theta)| - |\cos\theta - \sin\theta|$

(∵) $\sin(\pi-\theta) = \sin\theta$
$\cos(3\pi+\theta) = \cos(\pi+\theta) = -\cos\theta$

$= |1+\sin\theta| + |-\cos\theta| - |\cos\theta - \sin\theta|$

$= 1+\sin\theta - \cos\theta + \cos\theta - \sin\theta = 1$

6-18 ⑤



$\frac{1}{2} \times \pi = \frac{1}{2} \cdot 1^2 \cdot 2\theta + \frac{1}{2} \cdot 1 \cdot 1 \cdot \sin(\pi-\theta) \cdot 2$

$\pi = 2\theta + 2\sin\theta$

$\sin\theta = \frac{\pi}{2} - \theta$

6-19 -1

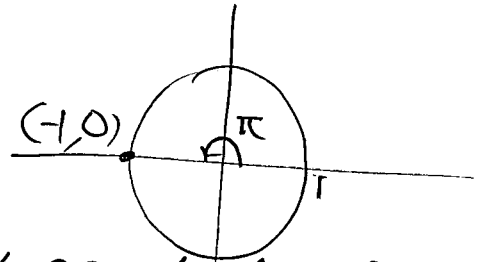
$10\theta = 2\pi$ $\quad 5\theta = \pi$

$\cos 5\theta = \cos\pi = -1$

$\cos 6\theta = \cos(\pi+\theta) = -\cos\theta$

$\cos 7\theta = \cos(\pi+2\theta) = -\cos 2\theta$

(준식) $= -1$

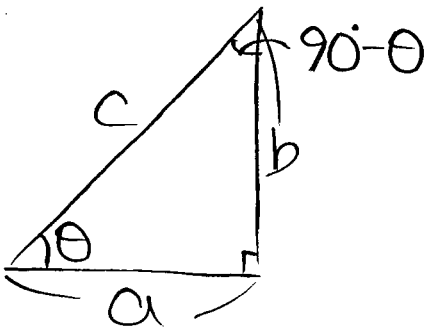


$\cos\theta + \cos 6\theta = 0$

$\cos 2\theta + \cos 7\theta = 0$

$\cos 3\theta + \cos 8\theta = 0$

$\cos 4\theta + \cos 9\theta = 0$



$\sin(90^\circ-\theta)=\cos\theta$

$\cos(90^\circ-\theta)=\sin\theta$

$\cos^2\theta+\sin^2\theta=1$

$\boxed{\sin^2(90^\circ-\theta)+\sin^2\theta=1}$

$\boxed{\cos^2\theta+\cos^2(90^\circ-\theta)=1}$

6-20|

(1) $\sin^2 2^\circ+\sin^2 88^\circ=1$

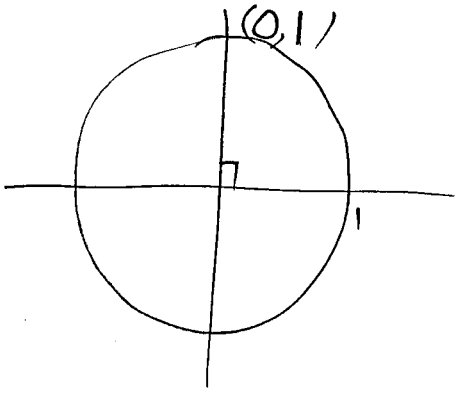
$\sin^2 4^\circ+\sin^2 86^\circ=1$

$\vdots$

$\sin^2 44^\circ+\sin^2 46^\circ=1$

$\sin^2 90^\circ=1$

(준식) $=23$



(2) $\cos^2 1^\circ+\cos^2 89^\circ=1$

$\cos^2 2^\circ+\cos^2 88^\circ=1$

$\vdots$

$\cos^2 44^\circ+\cos^2 46^\circ=1$

$\cos^2 45^\circ=\frac{1}{2}$

$\cos^2 90^\circ=0$

(준식) $=\frac{89}{2}$