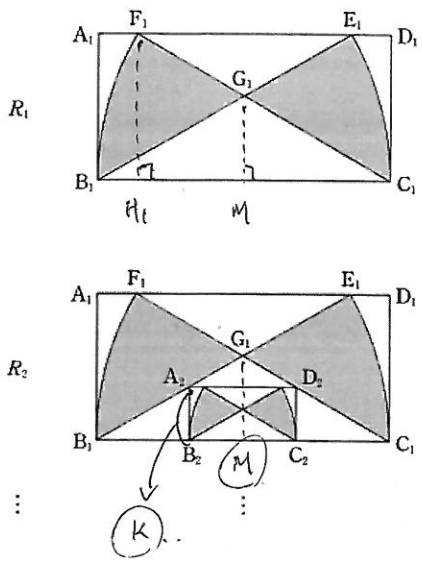
* 2019학년도 평가원 6월 수학 나형 18번.



$\overline{A_1B_1}=1$, $\overline{B_1C_1}=2$, 점 G_1에서 선분 B_1C_1에 내린 수선의 발을 M이라 하면 M은 선분 B_1C_1의 중점이고, 점 F_1에서 선분 B_1C_1에 내린 수선의 발을 H_1이라 하면 $\overline{G_1F_1}=2$, $\overline{F_1H_1}=1$.

$\therefore \angle F_1C_1H_1=30^\circ$. $\therefore \overline{G_1M}=\frac{1}{\sqrt{3}}$ ($\because \tan 30^\circ$).

1) n : $2\to 2$. $\therefore n=1$.

2) $\overline{A_2B_2}=k$ 라 하면 $l_r=\frac{\overline{A_2B_2}}{\overline{A_1B_1}}=\frac{k}{1}=k$.

$\overline{A_2B_2}=\overline{B_2M}=k$, $\overline{B_1B_2}=1-k$. $\therefore \frac{k}{1-k}=\tan 30^\circ=\frac{1}{\sqrt{3}}$.

$\therefore k=\frac{1}{\sqrt{3}+1}$. $\therefore l_r=\frac{1}{\sqrt{3}+1}$, $S_r=\frac{1}{4+2\sqrt{3}}=\frac{4-2\sqrt{3}}{4}=\frac{2-\sqrt{3}}{2}$.

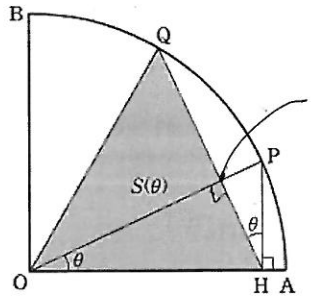
3) 부채꼴 $C_1F_1B_1$의 넓이는 $\frac{1}{2}\times 2^2\times\frac{\pi}{6}$

$\triangle B_1C_1G_1$의 넓이는 $\frac{1}{2}\times 2\times\frac{1}{\sqrt{3}}$.

$\therefore a=2\times\left(\frac{\pi}{3}-\frac{1}{\sqrt{3}}\right)=\frac{2}{3}\pi-\frac{2}{\sqrt{3}}=\frac{2\pi-2\sqrt{3}}{3}$.

따라서 $\lim_{n\to\infty}S_n=\frac{1}{1-r\times n}=\frac{\frac{2\pi-2\sqrt{3}}{3}}{1-\frac{2-\sqrt{3}}{2}}=\frac{\frac{2\pi-2\sqrt{3}}{3}}{\frac{\sqrt{3}}{2}}=\frac{4(\pi-\sqrt{3})}{3\sqrt{3}}=\frac{4\sqrt{3}\pi-12}{9}$ //

* 2019학년도 평가원 6월 수학 가형 16번.



$\overline{OB} = \overline{OA} = \overline{OQ} = \overline{OP} = 1 \ (=r)$.

$\overline{QH}$와 $\overline{OP}$의 교점을 T라 하자.

$\overline{OH} = \cos\theta$, $\overline{PH} = \sin\theta$, $\angle QHO = \frac{\pi}{2} - \theta$. $\therefore \angle OPH = \frac{\pi}{2}$.

$\overline{OT} = \cos^2\theta$, $\overline{HT} = \cos\theta\sin\theta$. $\overline{TQ} = \sqrt{1-\cos^4\theta} = \sin\theta \cdot \sqrt{1+\cos^2\theta}$.

$$\therefore \lim_{\theta\to 0+} \frac{S(\theta)}{\theta} = \lim_{\theta\to 0+} \frac{\frac{1}{2}\times\cos^2\theta\times\{\cos\theta\sin\theta+\sin\theta\sqrt{1+\cos^2\theta}\}}{\theta} = \lim_{\theta\to 0+} \frac{\frac{1}{2}\times\cos^2\theta\times\sin\theta\times\{\cos\theta+\sqrt{1+\cos^2\theta}\}}{\theta}$$

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

$(\triangle OHQ = \frac{1}{2}\times\overline{OT}\times\overline{QH})$