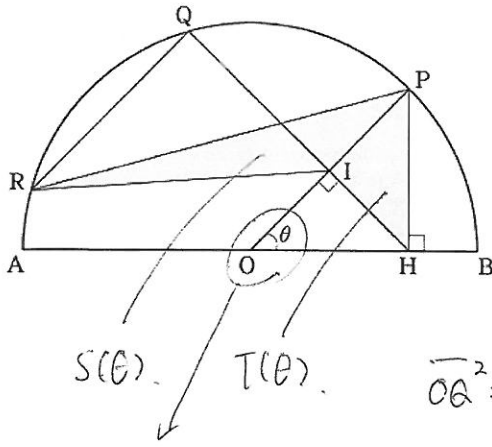


* 2019년 3월 시행 교육청 고3 수학 가형 19번.



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

$$\overline{OH} = \cos\theta, \overline{PH} = \sin\theta. \quad \overline{OI} = \cos^2\theta, \quad \overline{IH} = \cos\theta \times \sin\theta.$$

$$\overline{IP} = 1 - \overline{OI} = 1 - \cos^2\theta = \sin^2\theta.$$

$$\overline{OQ}^2 = \overline{OI}^2 + \overline{IQ}^2 \quad \therefore \overline{IQ} = \sqrt{1 - \cos^4\theta}$$

($\because \sin\theta > 0$)

$$= \sqrt{(1 - \cos^2\theta)(1 + \cos^2\theta)} = \sin\theta \times \sqrt{1 + \cos^2\theta}.$$

$$(0 < \theta < \frac{\pi}{2}).$$

$$\therefore S(\theta) = \frac{1}{2} \times \overline{IP} \times \overline{IQ}, \quad T(\theta) = \frac{1}{2} \times \overline{IP} \times \overline{IH}.$$

$$\lim_{\theta \rightarrow 0^+} \frac{S(\theta) - T(\theta)}{\theta^3} = \lim_{\theta \rightarrow 0^+} \frac{\frac{1}{2} \times \sin^2\theta \times \sin\theta \times \sqrt{1 + \cos^2\theta} - \frac{1}{2} \times \sin^2\theta \times \cos\theta \times \sin\theta}{\theta^3}$$

$$= \lim_{\theta \rightarrow 0^+} \left\{ \frac{1}{2} \times \frac{\sin^3\theta}{\theta^3} \times (\sqrt{1 + \cos^2\theta} - \cos\theta) \right\} = \frac{1}{2} \times 1 \times (\sqrt{2} - 1) = \frac{\sqrt{2} - 1}{2} //$$