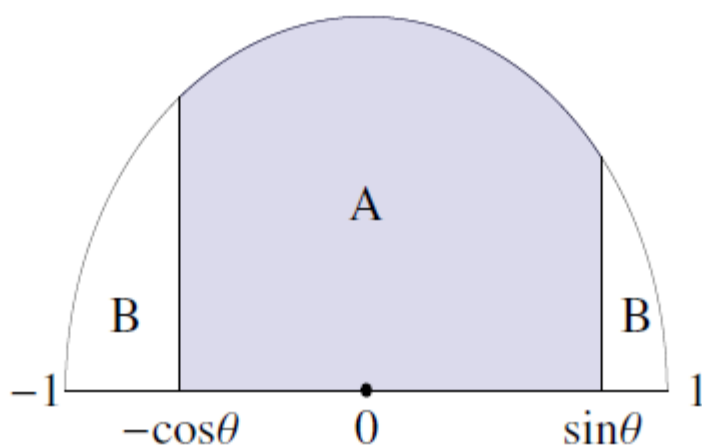


(i) Let $a > 0$. On the axes opposite, sketch the graph of

$$y = \frac{a+x}{a-x} \quad \text{for} \quad -a < x < a.$$

(ii) Let $0 < \theta < \pi/2$. In the diagram below is the half-disc given by $x^2 + y^2 \leq 1$ and $y \geq 0$. The shaded region A consists of those points with $-\cos \theta \leq x \leq \sin \theta$. The region B is the remainder of the half-disc.

Find the area of A .



(iii) Assuming *only* that $\sin^2 \theta + \cos^2 \theta = 1$, show that $\sin \theta \cos \theta \leq 1/2$.

(iv) What is the largest that the ratio

$$\frac{\text{area of } A}{\text{area of } B}$$

can be, as θ varies?