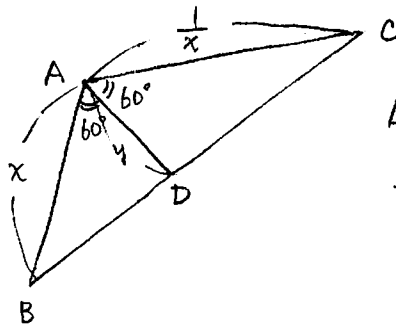


$$\angle A = 120^\circ, AB \cdot AC = 1$$



AD = y とすると

$$\frac{1}{2} x y \sin 60^\circ + \frac{1}{2} \times \frac{1}{x} y \sin 60^\circ = \frac{1}{2} x \times \frac{1}{x} \sin 120^\circ \text{ より}$$

$$xy + \frac{1}{x} y = 1$$

$$\frac{x^2 + 1}{x} y = 1$$

$$\therefore y = \frac{x}{x^2 + 1}$$

$$\therefore \boxed{AD = \frac{x}{x^2 + 1}}$$

(2) $f(x) = \frac{x}{x^2 + 1}$ とおくと $x > 0, \frac{1}{x} > 0$ より

$$f(x) = \frac{1}{x + \frac{1}{x}} \leq \frac{1}{2\sqrt{x \cdot \frac{1}{x}}} = \frac{1}{2}$$

$$\therefore AD \text{ の最大値は } \boxed{\frac{1}{2}}$$

$$\text{このとき } x = \frac{1}{x} \text{ より}$$

$$x^2 = 1$$

$$x > 0 \text{ より } \boxed{x = 1}$$