

$$8. \quad \lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^-} (a^2 - 2) = a^2 - 2$$

$$\lim_{x \rightarrow 0^+} f(x) = \lim_{x \rightarrow 0^+} \frac{ax}{\tan x} = a \left(\text{because } \lim_{x \rightarrow 0} \frac{\tan x}{x} = 1 \right)$$

Thus,

$$a^2 - 2 = a$$

$$a^2 - a - 2 = 0$$

$$(a - 2)(a + 1) = 0$$

$$a = -1, 2$$