

$$\textcircled{1} \lim_{x \rightarrow 1} \frac{x^2 - \sqrt{x+1}}{x^2 - \lambda x + \mu} = \frac{(x-1)(x+\mu)}{(x-1)(\lambda x - \mu)} = \frac{x+\mu}{\lambda x - \mu} = \frac{1}{\lambda}$$

$$\textcircled{2} \lim_{x \rightarrow 0} \frac{|x-1| - |x+1|}{x} = \frac{1 - |x-1| - |x+1|}{x} = \frac{-4x}{x} = -4$$

$$\textcircled{3} \lim_{x \rightarrow 1} \frac{x-1}{\sqrt{x}-1} = \frac{(\sqrt{x+1})(\sqrt{x}-1)}{\sqrt{x}-1} = \sqrt{x+1} = 1$$

$$\textcircled{4} \lim_{x \rightarrow 1} \frac{x - \sqrt{x}}{x^2 - x - 4} = \frac{1 - \frac{1}{\sqrt{x}}}{x-1} = \frac{1 - \frac{1}{1}}{1-1} = \frac{1}{1}$$

$$\textcircled{5} \lim_{x \rightarrow 1} \frac{1 - \sqrt{x}}{1 - \sqrt{x-2}} \xrightarrow{\text{L'Hôpital}} \frac{x^{\frac{1}{2}}}{\frac{1}{2}\sqrt{x-2}} = \frac{1-x}{\frac{1}{2}(x-2)} = \frac{-2(x-1)}{x-1} = -2$$

$$\textcircled{6} \lim_{x \rightarrow 1} \frac{\sqrt{x+1} - 1}{\sqrt{x+1} - 1} \xrightarrow{\text{L'Hôpital}} \frac{\frac{1}{2\sqrt{x+1}}}{\frac{1}{2\sqrt{x+1}}} = \frac{x+1-1}{x+1-1} = \frac{x}{x+1} = \frac{1}{2}$$

$$\textcircled{7} \lim_{x \rightarrow 1} \frac{\sqrt{x+1} - 1}{\sqrt{x} - 1} \xrightarrow{\text{L'Hôpital}} \frac{\frac{1}{2\sqrt{x+1}}}{\frac{1}{2\sqrt{x}}} = \frac{\sqrt{x}}{\sqrt{x+1}} = \frac{1}{\sqrt{2}}$$

$$\textcircled{8} \lim_{x \rightarrow \pi} \frac{1 + \cos x}{\sin x} = \frac{(\cos x + 1)(\cos x - \cos x + 1)}{(1 - \cos x)(1 + \cos x)} = \frac{1 - 1 + 1}{1} = 1$$

$$\textcircled{9} \lim_{x \rightarrow \frac{\pi}{4}} \frac{1 - \tan x}{\sin x - \cos x} = \frac{-\sin x + \cos x}{\cos x} = \frac{-1}{\frac{\sqrt{2}}{2}} = -\sqrt{2}$$

$$\textcircled{10} \lim_{x \rightarrow \frac{\pi}{4}} \frac{\tan x - 1}{\cos x} = \frac{\sin x - \cos x}{\cos x} = \frac{-1}{\frac{\sqrt{2}}{2}} = -\sqrt{2}$$