

$$\text{hop} \rightarrow \frac{\lambda x - \sqrt{x}}{\log x - 1} \xrightarrow{x=1} \left[\frac{1}{\sqrt{e}} \right] \checkmark \quad (2) - 1$$

$$\frac{-2x + 1 - 2x - 1}{x} = \frac{-4x}{x} = \boxed{-4} \checkmark \quad (2) - 2$$

$$\frac{x - 4}{\sqrt{x} - 2} = \frac{(\sqrt{x} - 2)(\sqrt{x} + 2)}{\sqrt{x} - 2} = \sqrt{x} + 2 = 2 + 2 = \boxed{4} \checkmark \quad (2) - 3$$

$$\text{hop} \rightarrow \frac{1 - \frac{2}{\sqrt{x}}}{\sqrt{x} - 1} = \frac{1 - \frac{1}{\sqrt{x}}}{\sqrt{x} - 1} = \left[\frac{1}{\sqrt{x}} \right] \checkmark \quad (2) - 4$$

$$\lim_{x \rightarrow 1} \frac{1 - \sqrt{x}}{1 - \sqrt{1-x}} \times \frac{1}{1} = \frac{1-x}{1-x} \times \frac{1}{1} = \boxed{1} \checkmark \quad (2) - 5$$

$$\lim_{x \rightarrow 4} \frac{\sqrt{3x+5} - 4}{\sqrt{2x+1} - 2} \times \frac{1}{1} = \frac{3x+5-16}{2x+1-2} = \frac{3x-11}{2x-1}$$

$$= \frac{3(4-4)}{2(4-4)} \times \frac{1}{1} = \left[\frac{11}{2} \right] \checkmark \quad (2) - 6$$

$$\text{hop} \rightarrow \frac{3 + \frac{1}{\sqrt{x}}}{\sqrt{3x+1} + \sqrt{x}} \times \frac{1}{\frac{1}{\sqrt{x}}} = \frac{3\sqrt{x} + 1}{\sqrt{3x+1} + \sqrt{x}} = \frac{3}{1} = \boxed{3} \checkmark \quad (2) - 7$$

$$\lim_{x \rightarrow \pi} \frac{1 + \cos^2 x}{\sin^2 x} = \frac{(1 + \cos x)(1 + \cos^2 x - \cos x)}{1 - \cos^2 x} \quad (2) - 8$$

$$= \frac{(1 + \cos x)(1 + \cos^2 x - \cos x)}{(1 - \cos x)(1 + \cos x)} = \frac{1}{1} = \boxed{1} \checkmark$$

$$\lim_{x \rightarrow \frac{\pi}{4}} \frac{1 - \tan x}{\sin x - \cos x} = \frac{1-1}{\frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2}} = \frac{0}{0} \quad (2) - 9$$

$$\Rightarrow \frac{\cos x - \sin x}{\cos x} = \frac{-1}{\cos x} = \frac{-1}{\frac{\sqrt{2}}{2}} = \boxed{-\sqrt{2}} \checkmark$$

$$\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sin^2 x - \cos^2 x}{\cos^2 x} = \frac{-1}{\cos^2 x} = \frac{-1}{\frac{1}{2}} = \boxed{-2} \checkmark \quad (2) - 10$$