

$$\#1 \lim_{l \rightarrow 2} \frac{l-2}{l^2-6l+8}$$

$$\lim_{l \rightarrow 2} \frac{l-2}{(l-2)(l-4)}$$

$$\lim_{l \rightarrow 2} \frac{1}{l-4} = \frac{-1}{2}$$

$$\#2 \lim_{H \rightarrow 0} \frac{5H^3+8H^2}{3H^4-16H^2}$$

$$\lim_{H \rightarrow 0} \frac{H^2(5H+8)}{H^2(3H^2-16)}$$

$$\lim_{H \rightarrow 0} \frac{5H+8}{3H^2-16} = \frac{-1}{2}$$

$$\#3 \lim_{t \rightarrow -4} (t+3)^{1976}$$

$$(-1)^{1976}$$

$$\lim_{t \rightarrow -4} (t+3)^{1976} = 1$$

$$\#4 \lim_{x \rightarrow m} \frac{x^3-m^3}{x^4-m^4}$$

$$\lim_{x \rightarrow m} \frac{(x-m)(x^2+mx+m^2)}{(x-m)(x+m)(x^2+m^2)}$$

$$\lim_{x \rightarrow m} \frac{x^2+mx+m^2}{(x+m)(x^2+m^2)} = \frac{m^2+m^2+m^2}{(2m)(2m^2)}$$

$$= \frac{3m^2}{4m^3}$$

$$= \frac{3}{4m}$$

$$\#5 \quad \lim_{\Delta x \rightarrow 0} \frac{2(x+\Delta x) - 2x}{\Delta x}$$

$$\lim_{\Delta x \rightarrow 0} \frac{2x + 2\Delta x - 2x}{\Delta x}$$

$$\lim_{\Delta x \rightarrow 0} \frac{2\Delta x}{\Delta x} = 2$$

$$\#6 \quad \lim_{\Delta x \rightarrow 0} \frac{(x+\Delta x)^2 - 2(x+\Delta x) + 1 - (x^2 - 2x + 1)}{\Delta x}$$

$$\lim_{\Delta x \rightarrow 0} \frac{x^2 + 2\Delta x \cdot x + \Delta x^2 - 2x - 2\Delta x + 1 - x^2 + 2x - 1}{\Delta x}$$

$$\lim_{\Delta x \rightarrow 0} \frac{2\Delta x \cdot x + \Delta x^2 - 2\Delta x}{\Delta x}$$

$$\lim_{\Delta x \rightarrow 0} 2x + \Delta x - 2 = 2x - 2$$

$$\#7 \quad \lim_{\Delta x \rightarrow 0} \frac{(1 + \Delta x)^3 - 1}{\Delta x}$$

$$\lim_{\Delta x \rightarrow 0} \frac{1 + 3\Delta x + 3\Delta x^2 + \Delta x^3 - 1}{\Delta x}$$

$$\lim_{\Delta x \rightarrow 0} \frac{3\Delta x + 3\Delta x^2 + \Delta x^3}{\Delta x}$$

$$\lim_{\Delta x \rightarrow 0} 3 + 3\Delta x + \Delta x^2 = 3$$

$$\#8 \quad \lim_{\theta \rightarrow 0} \frac{(1 - \cos \theta)^2}{\theta}$$

$$\lim_{\theta \rightarrow 0} \frac{1 - \cos \theta}{\theta} \cdot (1 - \cos \theta)$$

$$= 0 \cdot (1 - 1)$$

$$\boxed{= 0}$$

$$\#9 \quad \lim_{k \rightarrow 1} \frac{k+1}{k^2+k+1}$$

$$\boxed{= \frac{2}{3}}$$

$$\#10 \quad \lim_{g \rightarrow 2} \frac{\sqrt{2g+3} - \sqrt{7}}{g-2}$$

$$\lim_{g \rightarrow 2} \frac{\sqrt{2g+3} - \sqrt{7}}{(g-2)} \cdot \frac{\sqrt{2g+3} + \sqrt{7}}{\sqrt{2g+3} + \sqrt{7}}$$

$$\lim_{g \rightarrow 2} \frac{2g+3-7}{(g-2)(\sqrt{2g+3} + \sqrt{7})}$$

$$\lim_{g \rightarrow 2} \frac{2g-4}{(g-2)(\sqrt{2g+3} + \sqrt{7})}$$

$$\lim_{g \rightarrow 2} \frac{2(g-2)}{(g-2)(\sqrt{2g+3} + \sqrt{7})}$$

$$\lim_{g \rightarrow 2} \frac{2}{\sqrt{2g+3} + \sqrt{7}} = \frac{2}{2\sqrt{7}} = \boxed{\frac{\sqrt{7}}{7}}$$

$$\#11 \quad \lim_{r \rightarrow 0} \frac{\frac{1}{r+1} - 1}{r}$$

$$\lim_{r \rightarrow 0} \frac{\frac{1}{r+1} - \frac{r+1}{r+1}}{r}$$

$$\lim_{r \rightarrow 0} \frac{1 - r - 1}{r+1} \cdot \frac{1}{r}$$

$$\lim_{r \rightarrow 0} \frac{0 \cdot r}{r+1} \cdot \frac{1}{r}$$

$$\lim_{r \rightarrow 0} \frac{0 \cdot 1}{r+1} = 0 \cdot 1$$

$$\#12 \quad \lim_{z \rightarrow 3} \frac{\frac{z}{z+2} - \frac{3}{5}}{z-3}$$

$$\lim_{z \rightarrow 3} \frac{5z - 3z - 6}{5(z+2)} \cdot \frac{1}{z-3}$$

$$\lim_{z \rightarrow 3} \frac{2z - 6}{5(z+2)} \cdot \frac{1}{z-3}$$

$$\lim_{z \rightarrow 3} \frac{2(z-3)}{5(z+2)(z-3)}$$

$$\lim_{z \rightarrow 3} \frac{2}{5(z+2)} = \frac{2}{5(5)} = \frac{2}{25}$$

$$\#13 \quad \lim_{D \rightarrow -3} \frac{D^2 + 7D + 12}{D+3}$$

$$\lim_{D \rightarrow -3} \frac{(D+3)(D+4)}{D+3}$$

$$\lim_{D \rightarrow -3} D+4 = -3+4 \quad \boxed{= 1}$$

$$\#14 \quad \lim_{\theta \rightarrow 0} \frac{\cos \theta \cdot \tan \theta}{\theta}$$

$$\lim_{\theta \rightarrow 0} \frac{\cos \theta \cdot \frac{\sin \theta}{\cos \theta}}{\theta}$$

$$\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} \quad \boxed{= 1}$$

$$\#15 \quad \lim_{\phi \rightarrow \pi} \phi \sec \phi$$

$$= \pi(-1) \quad \boxed{= -\pi}$$

$$\#16 \quad \lim_{x \rightarrow 0} \frac{\sec 2x \tan 2x}{x}$$

$$\lim_{x \rightarrow 0} \frac{\frac{1}{\cos 2x} \cdot \frac{\sin 2x}{\cos 2x}}{x}$$

$$\lim_{x \rightarrow 0} \frac{1}{(\cos 2x)^2} \cdot \frac{\sin 2x}{x}$$

$$\lim_{x \rightarrow 0} \frac{1}{(\cos 2x)^2} \cdot \lim_{x \rightarrow 0} 2 \frac{\sin 2x}{2x}$$

$$= 1 \cdot 2$$

$$\boxed{= 2}$$

$$\#17 \quad \lim_{l \rightarrow 0} \frac{\cos 2l \cdot \tan 2l}{l}$$

$$\lim_{l \rightarrow 0} \frac{\cos 2l \cdot \frac{\sin 2l}{\cos 2l}}{l}$$

$$\lim_{l \rightarrow 0} \frac{2 \cdot \frac{\sin 2l}{2l}}{1} = 2$$

$$\#18 \quad \lim_{\rho \rightarrow \pi/4} \frac{1 - \tan \rho}{\sin \rho - \cos \rho}$$

$$\lim_{\rho \rightarrow \pi/4} \frac{1 - \frac{\sin \rho}{\cos \rho}}{\sin \rho - \cos \rho}$$

$$\lim_{\rho \rightarrow \pi/4} \frac{\frac{\cos \rho - \sin \rho}{\cos \rho}}{\sin \rho - \cos \rho}$$

$$\lim_{\rho \rightarrow \pi/4} \frac{-1 (\sin \rho - \cos \rho)}{\cos \rho} \cdot \frac{1}{(\sin \rho - \cos \rho)}$$

$$\lim_{\rho \rightarrow \pi/4} \frac{-1}{\cos \rho} = \frac{-1}{\frac{\sqrt{2}}{2}} = \frac{-2}{\sqrt{2}} = -\sqrt{2}$$

$$\#19 \quad \lim_{w \rightarrow 0} \frac{\sin 7w}{14w}$$

$$\lim_{w \rightarrow 0} \frac{\sin 7w}{2 \cdot 7w} = \frac{1}{2}$$

$$\#20 \quad \lim_{\theta \rightarrow 0} \theta^3 \cot \theta \csc \theta$$

$$\lim_{\theta \rightarrow 0} \theta^3 \frac{\cos \theta}{\sin \theta} \cdot \frac{1}{\sin \theta}$$

$$\lim_{\theta \rightarrow 0} \frac{\theta}{\sin \theta} \cdot \frac{\theta}{\sin \theta} \cdot \cos \theta \cdot \theta$$

$$= 1 \cdot 1 \cdot 1 \cdot 0$$

$$\boxed{= 0}$$

$$\#21 \quad \lim_{x \rightarrow 0} \frac{\sec x - 1}{x \sec x}$$

$$\lim_{x \rightarrow 0} \frac{\frac{1}{\cos x} - \frac{\cos x}{\cos x}}{\frac{x}{\cos x}}$$

$$\lim_{x \rightarrow 0} \frac{1 - \cos x}{\cos x} \cdot \frac{\cos x}{x}$$

$$\lim_{x \rightarrow 0} \frac{1 - \cos x}{x} \quad \boxed{= 0}$$

$$\#22 \quad \lim_{v \rightarrow 0} \frac{\sin 4v}{5v}$$

$$\lim_{v \rightarrow 0} 4 \frac{\sin 4v}{5 \cdot 4v}$$

$$\lim_{v \rightarrow 0} \frac{4}{5} \cdot \frac{\sin 4v}{4v} \quad \boxed{= \frac{4}{5}}$$