

بازدهم فصل

تکلیف شماره 30

فصل پنجم (20)

$$\lim_{n \rightarrow 1} \frac{\varepsilon n^2 - \sqrt{n} + 3}{2n^2 - 1n + c} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} \frac{\varepsilon n^2 - \sqrt{n} + c}{2n^2 - 1n + c} = \frac{(n-1)(\varepsilon n - c)}{(n-1)(2n - c)}$$
$$= \frac{(\varepsilon \times 1) - c}{(2 \times 1) - c} = \left( \frac{1}{2} \right)$$

$$\lim_{n \rightarrow 0} \frac{|3n - 1| - |3n + 1|}{n} = \frac{-3n + 1 - 3n - 1}{n} = \frac{-6n}{n} = -6$$

$$\lim_{n \rightarrow \varepsilon} \frac{n - \varepsilon}{\sqrt{n} - 2} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} \frac{(\sqrt{n} - 2)(\sqrt{n} + 2)}{\sqrt{n} - 2} = \sqrt{\varepsilon} + 2 = 8$$

$$\lim_{n \rightarrow 2} \frac{n - \sqrt{n}}{n^2 - n - 4} = \frac{0}{0} \xrightarrow{\text{رفع ابهام}} \frac{\sqrt{n} (\sqrt{n} - \sqrt{2})}{(\sqrt{n} - \sqrt{2})(\sqrt{n} + \sqrt{2})(n - 2)}$$
$$= \frac{\sqrt{2}}{2\sqrt{2} \times 2} = \left( \frac{1}{4} \right)$$

$$\lim_{n \rightarrow 1} \frac{1 - \sqrt{n}}{2 - \sqrt{2-n}} = \frac{0}{0} \xrightarrow{\text{لایحه}} \frac{1 - \sqrt{n}}{2 - \sqrt{2-n}} \times \frac{1 + \sqrt{n}}{1 + \sqrt{n}} \times \frac{\varepsilon}{2}$$
$$= \frac{1 - n}{\varepsilon - 2 + n} \times 2 = \frac{1 - n}{-(1 - n)} \times 2 = -2$$

$$\lim_{n \rightarrow \infty} \frac{\sqrt{2n+5} - 5}{\sqrt{2n+5} - 5} = \frac{0}{0} \text{ (L'Hôpital's rule)}$$

$$\frac{\sqrt{2n+5} - 5}{\sqrt{2n+5} - 5} \times \frac{\sqrt{2n+5} + 5}{\sqrt{2n+5} + 5} \times \frac{2 \times 9}{1} = \frac{2n+5 - 25}{2n+5+5} \times \frac{18}{1}$$

$$= \frac{2n - 20}{2n + 10} \times \frac{18}{1} = \frac{2n - 20}{2n + 10} \times \frac{18}{1} = \frac{18}{1}$$

$$\lim_{n \rightarrow 1} \frac{\sqrt{2n+2} - 2}{\sqrt{2n} - 1} = \frac{0}{0} \text{ (L'Hôpital's rule)}$$

$$\frac{\sqrt{2n+2} - 2}{\sqrt{2n} - 1} \times \frac{\sqrt{2n+2} + 2}{\sqrt{2n+2} + 2} \times \frac{2}{2} = \frac{2n+2 - 4}{2n - 1} \times \frac{2}{2}$$

$$= \frac{(2\sqrt{2n} + 2)(\sqrt{2n} - 1)}{(\sqrt{2n} - 1)(\sqrt{2n} + 1)} \times \frac{2}{2} = \frac{2}{1} \times \frac{2}{2} = \frac{2}{1}$$

$$\lim_{n \rightarrow \pi} \frac{1 + \cos^2 n}{\sin^2 n} = \frac{0}{0} \text{ (L'Hôpital's rule)}$$

$$= \frac{1 + (-1)^2 - (-1)}{1 - (-1)} = \frac{3}{2}$$

$$\lim_{n \rightarrow \frac{\pi}{2}} \frac{\tan^n n - 1}{\cos^n n} = \frac{0^{\sim}}{0^{\sim}} \text{ (L'Hôpital)} \rightarrow \frac{1 - \frac{\sin n}{\cos n}}{\sin n - \cos n} = \frac{\frac{\cos n - \sin n}{\cos n}}{\sin n - \cos n}$$

$$= \frac{-1}{\cos n} = \frac{-1}{\frac{\sqrt{r}}{r}} = \frac{-r}{\sqrt{r}} = \boxed{-\sqrt{r}}$$

$$\lim_{n \rightarrow \frac{\pi}{2}} \frac{\tan^n n - 1}{\cos^n n} = \frac{0^{\sim}}{0^{\sim}} \text{ (L'Hôpital)} \rightarrow \frac{\frac{1 - \cos n}{1 + \cos n} - 1}{\cos^n n}$$

$$= \frac{\frac{1 - \cos n - 1 - \cos n}{1 + \cos n}}{\cos^n n} = \frac{\frac{-2 \cos n}{1 + \cos n}}{\cos^n n} = \frac{-r}{1 + 0} = \boxed{-r}$$