

Exercise 1E

Question 16:

Given,
$$x = (4 - \sqrt{15})$$

Then,

$$\begin{pmatrix} x + \frac{1}{x} \end{pmatrix} = \begin{pmatrix} 4 - \sqrt{15} + \frac{1}{4 - \sqrt{15}} \end{pmatrix}$$

$$= \begin{pmatrix} 4 - \sqrt{15} + \frac{1}{4 - \sqrt{15}} \times \frac{4 + \sqrt{15}}{4 + \sqrt{15}} \end{pmatrix} \text{ [rationalisation]}$$

$$= \begin{pmatrix} 4 - \sqrt{15} + \frac{4 + \sqrt{15}}{(4)^2 - (\sqrt{15})^2} \end{pmatrix}$$

$$= \begin{pmatrix} 4 - \sqrt{15} + \frac{4 + \sqrt{15}}{16 - 15} \end{pmatrix}$$

$$= \begin{pmatrix} 4 - \sqrt{15} + \frac{4 + \sqrt{15}}{1} \end{pmatrix}$$

$$= 4 - \sqrt{15} + 4 + \sqrt{15} = 8.$$

Question 17:

Given,
$$x = (2 + \sqrt{3})$$

Question 18:

L.H.S =
$$\frac{1}{(3-\sqrt{8})} - \frac{1}{(\sqrt{8}-\sqrt{7})} + \frac{1}{(\sqrt{7}-\sqrt{6})} - \frac{1}{(\sqrt{6}-\sqrt{5})} + \frac{1}{(\sqrt{5}-2)}$$

$$= \frac{3+\sqrt{8}}{(3-\sqrt{8})(3+\sqrt{8})} - \frac{\sqrt{8}+\sqrt{7}}{(\sqrt{8}-\sqrt{7})(\sqrt{8}+\sqrt{7})} + \frac{\sqrt{7}+\sqrt{6}}{(\sqrt{7}-\sqrt{6})(\sqrt{7}+\sqrt{6})}$$

$$- \frac{\sqrt{6}+\sqrt{5}}{(\sqrt{6}-\sqrt{5})(\sqrt{6}+\sqrt{5})} + \frac{\sqrt{5}+2}{(\sqrt{5}-2)(\sqrt{5}+2)}$$

$$= \frac{3+\sqrt{8}}{9-8} - \frac{\sqrt{8}+\sqrt{7}}{8-7} + \frac{\sqrt{7}+\sqrt{6}}{7-6} - \frac{\sqrt{6}+\sqrt{5}}{6-5} + \frac{\sqrt{5}+2}{5-4}$$

$$= 3+\sqrt{8}-\sqrt{8}-\sqrt{7}+\sqrt{7}+\sqrt{6}-\sqrt{6}-\sqrt{5}+\sqrt{5}+2$$

$$= 3+2=5=\text{R.H.S}$$

$$\therefore \text{L.H.S} = \text{R.H.S}$$

******* END *******