

Section: A

1) $0.5100100010000\dots$
 $0.52398721\dots$

2) $5^{x+2x} = 25$
 $5^{3x} = 5^2$
 $3x = 2$
 $x = \frac{2}{3}$

3) $\frac{\sqrt{2}}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{3}} = \frac{\sqrt{10}}{5}$

54) $25^3 - 75^3 + 50^3$
Here, $a+b+c = 25 - 75 + 50 = 0$
 $\therefore a^3 + b^3 + c^3 = 3abc$
 $= 3(25)(-75)(50)$
 $= -281250$

4) $P(x) = x^2 - 4x - 5$
 $x-3$ is factor of $P(x)$ then $P(3) = 0$
 $P(3) = 9 - 3x - 5$
 $0 = 4 - 3x$
 $x = \frac{4}{3}$

69 ~~$P(x) = x^2 + 2x + 5$~~
 ~~$\deg(P(x)) = 2$~~

6) zero.

Section : B

$$\begin{aligned} 7) \quad x &= 4.3\bar{2} \\ 10x &= 43.\bar{2} \\ 100x &= 432.\bar{2} \\ 100x - 10x &= 432.\bar{2} - 43.\bar{2} \\ 90x &= 4\cancel{29}38.9 \\ \boxed{x} &= \frac{389}{90} \end{aligned}$$

$$\begin{aligned} 8) \quad (2a - 3b - 4c)^2 & \\ &= (2a)^2 + 2(3b)^2 + (-4c)^2 + 2(2a)(-3b) + 2(-3b)(-4c) + 2(-4c)(2a) \\ &= 4a^2 + 12b^2 + 16c^2 - 12ab + 24bc - 16ac \end{aligned}$$

Section : C

$$\begin{aligned} 9) \quad \frac{\sqrt{5}-2}{\sqrt{5}+2} &= \frac{\sqrt{5}+2}{\sqrt{5}-2} \\ &= \frac{(\sqrt{5}-2)^2 - (\sqrt{5}+2)^2}{(\sqrt{5}+2)(\sqrt{5}-2)} \\ &= \frac{5 - 4\sqrt{5} + 4 - 5 - 4\sqrt{5} - 4}{5 - 4} \end{aligned}$$

$$= -8\sqrt{5}$$

$$\begin{aligned} 10) \quad \frac{1/a}{1/a + 1/b} + \frac{1/a}{1/a - 1/b} &= \frac{1/a}{\frac{a+b}{ab}} + \frac{1/a}{\frac{b-a}{ab}} \\ &= \frac{ab}{a(b+a)} + \frac{ab}{a(b-a)} \\ &= \frac{b}{b+a} + \frac{b}{b-a} \\ &= \frac{b^2 - ab + b^2 + ab}{b^2 - a^2} \\ &= \frac{2b^2}{b^2 - a^2} \end{aligned}$$

$$\begin{aligned}
 11) \text{ R.H.S.} &= \frac{1}{2} (a+b+c) [(a-b)^2 + (b-c)^2 + (c-a)^2] \\
 &= \frac{1}{2} (a+b+c) [a^2 - 2ab + b^2 + b^2 - 2bc + c^2 + c^2 - 2ca + a^2] \\
 &= \frac{1}{2} (a+b+c) (2a^2 + 2b^2 + 2c^2 - 2ab - 2bc - 2ca) \\
 &= (a+b+c) (a^2 + b^2 + c^2 - ab - bc - ca) \\
 &= a^3 + b^3 + c^3 - 3abc.
 \end{aligned}$$

$$12) \quad p(x) = x^3 - 6x^2 + 3x + 10$$

The possible factors of $p(x)$ are: $\pm 1, \pm 2, \pm 5, \pm 10$.

$$p(1) = 1 - 6 + 3 + 10 \neq 0$$

$$p(-1) = -1 - 6 - 3 + 10 = 0$$

$\therefore (x+1)$ is a factor of $p(x)$.

$$\begin{aligned}
 \therefore p(x) &= x^3 - 6x^2 + 3x + 10 \\
 &= x^3 + x^2 - 7x^2 - 7x + 10x + 10 \\
 &= x^2(x+1) - 7x(x+1) + 10(x+1) \\
 &= (x+1)(x^2 - 7x + 10) \quad \text{--- (i)}
 \end{aligned}$$

$$\begin{aligned}
 \rightarrow x^2 - 7x + 10 &= x^2 - 2x - 5x + 10 \\
 &= x(x-2) - 5x(x-2) \\
 &= (x-2)(x-5) \quad \text{--- (ii)}
 \end{aligned}$$

\therefore From (i) & (ii)

$$p(x) = (x+1)(x-2)(x-5)$$