

$$\begin{aligned}
 A &= 9(4x^2 - 4x + 1) + 2(2x - 1) \\
 &= 9(2x - 1)^2 + 2(2x - 1) \\
 &= (2x - 1)[9(2x - 1) + 2] \\
 &= (2x - 1)(18x - 7)
 \end{aligned}$$

$$\begin{aligned}
 B &= \frac{x^2 - 9}{\frac{5}{2}} - \frac{x + 3}{\frac{2}{5}} \\
 &= \frac{2(x^2 - 9) - 5(x + 3)}{10} \\
 &= \frac{2(x - 3)(x + 3) - 5(x + 3)}{10} \\
 &= \frac{(x + 3)[2(x - 3) - 5]}{10} \\
 &= \frac{(x + 3)(2x - 11)}{10}
 \end{aligned}$$

$$\begin{aligned}
 C &= (x + 1)(8x - 4) - (2x - 1)^2 \\
 &= 4(x + 1)(2x - 1) - (2x - 1)^2 \\
 &= (2x - 1)[4(x + 1) - 1] \\
 &= (2x - 1)(4x + 3)
 \end{aligned}$$

$$D = x^3 + x^2 + x + 1 = (x + 1)^2(x + 1)$$

$$D = (x^3 + x^2) + (x + 1)$$

$$D = x^2(x + 1) + (x + 1)$$

$$D = (x + 1)(x^2 + 1)$$

$$\textcircled{1} 9x^2 - 1 = 3x + 1$$

$$(3x - 1)(3x + 1) - (3x + 1) = 0$$

$$(3x + 1)(3x - 1 - 1) = 0$$

$$(3x + 1)(3x - 2) = 0$$

$$\text{یا } 3x + 1 = 0 \Rightarrow x = -\frac{1}{3}$$

$$\text{یا } 3x - 2 = 0 \Rightarrow x = \frac{2}{3}$$

$\left\{-\frac{1}{3}, \frac{2}{3}\right\}$ حل ہیں

تقریباً مسائل پر مشتمل ہے

1

$$A = \sqrt{2} - \sqrt{6}$$

$$B = \sqrt{6}$$

$$\textcircled{1} A^2 + B = (\sqrt{2} - \sqrt{6})^2 + \sqrt{6}$$

$$= 2 - 2\sqrt{12} + 6 + \sqrt{6}$$

$$= 8 - 2\sqrt{12} + \sqrt{6} \quad \text{غیر معادلی}$$

$$\textcircled{2} 5 - A^2 = 5 - (8 - 2\sqrt{12}) = -3 + 2\sqrt{12}$$

$$\textcircled{3} B^2 = (\sqrt{6})^2 = 6 \quad \text{(معادلی) غیر معادلی}$$

T. Waseem Zaidun

$$\textcircled{1} \sqrt{1 + \frac{3}{5}} \times \sqrt{1 - \frac{3}{5}} = \sqrt{\left(1 + \frac{3}{5}\right)\left(1 - \frac{3}{5}\right)}$$

$$= \sqrt{1 - \frac{9}{25}} = \sqrt{\frac{16}{25}}$$

$$= \frac{4}{5} \quad \text{معادلی}$$

$$\textcircled{2} \sqrt{1 + \frac{5}{13}} \times \sqrt{1 - \frac{5}{13}}$$

$$= \sqrt{\left(1 + \frac{5}{13}\right)\left(1 - \frac{5}{13}\right)} = \sqrt{1^2 - \left(\frac{5}{13}\right)^2} = \sqrt{1 - \frac{25}{169}}$$

$$= \sqrt{\frac{144}{169}} = \frac{12}{13} \quad \text{(معادلی)}$$

$$\left(\sqrt{\frac{5}{2}} - \sqrt{\frac{2}{5}}\right)^2 = \frac{5}{2} - 2\left(\sqrt{\frac{5}{2}} \times \sqrt{\frac{2}{5}}\right) + \frac{2}{5}$$

$$= \frac{5}{2} - 2 + \frac{2}{5}$$

$$= \frac{25 - 20 + 4}{10} = \frac{9}{10}$$

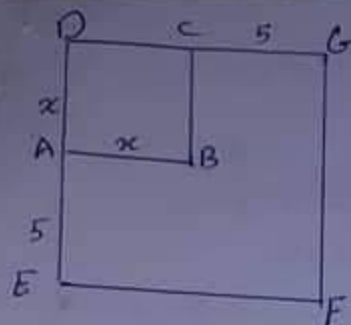
معادلی

$$\left(\sqrt{\frac{4}{3}} + \sqrt{\frac{3}{4}}\right) = \frac{4}{3} + 2 + \frac{3}{4}$$

$$= \frac{16 + 24 + 9}{12} = \frac{49}{12}$$

$$= \frac{49}{12}$$

معادلی



(8) -15

$AB = x$ نفرض

$DE = x + 5$

$S_{DEFG} = 4S_{PABC}$

$(x+5)^2 = 4x^2$

$(x+5)^2 - 4x^2 = 0$

$(x+5-2x)(x+5+2x) = 0$

$(-x+5)(3x+5) = 0$

$x = 5$

$x = -\frac{5}{3}$ (مرفوض)

المترين: 5 و 13

(16)

مساحة دائرة نصف قطرها x هي πx^2

مساحة ربع دائرة نصف قطرها x هي $\frac{\pi}{4}x^2$

مساحة دائرة نصف قطرها $2x$ هي $4\pi x^2$

مساحة ربع دائرة نصف قطرها x هي $\frac{\pi}{4}x^2$

مساحة ربع دائرة نصف قطرها $4x$ هي $4\pi x^2$

$S = x^2 + \frac{\pi}{4}x^2 + \pi x^2 + \frac{9\pi}{4}x^2 + 4x^2$

نفرض $x = 2$ م

$S \approx 98.2$

(17) المثلثان

$v_1 = \frac{AB}{2} = \frac{l}{2}$ $h = 2l$

$v_1 = S_1 \cdot h = \pi v_1^2 \cdot h$

$v_1 = \pi \left(\frac{l}{2}\right)^2 \cdot 2l = \frac{\pi l^3}{2}$

$v_2 = \frac{AD}{2} = l$ $h = l$

$v_2 = S_2 \cdot h = \pi v_2^2 \cdot h$

$v_1 = \frac{\pi l^3}{2} = \pi l^2 \cdot l = \pi l^3$

$\frac{v_1}{v_2} = \frac{\frac{\pi l^3}{2}}{\pi l^3} = \frac{1}{2} \times \frac{1}{\pi l^3} = \frac{1}{2}$

(7)

$\frac{a}{b} = \frac{c}{d}$

$\Rightarrow ad = bc$

أيضا $ad - bc = 0$

$\frac{a}{b} - \frac{c+a}{d+b}$

$= \frac{a(d+b) - b(c+a)}{b(d+b)}$

$= \frac{ad+ab-bc-ba}{b(d+b)}$

$= \frac{ad-bc+ab-ba}{b(d+b)}$

$= \frac{0+0}{b(d+b)} = 0$

$\frac{a}{b} = \frac{c+a}{d+b}$

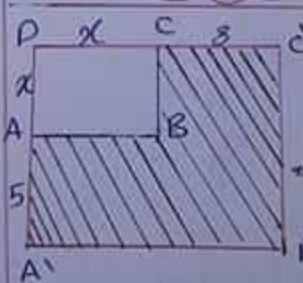
$\frac{a}{b} - \frac{c-a}{d-b} = 0$

$\frac{a(d-b) - b(c-a)}{b(d-b)} = 0$

$\frac{ad-ab-bc+ab}{b(d-b)} = 0$

$\frac{0}{b(d-b)} = 0 \Rightarrow 0 = 0$

$\frac{a}{b} = \frac{c-a}{d-b}$



$S_{D'C'B'A'} - S_{DCBA} = 183$

$(D'C')(D'A') - (DC)^2 = 183$

$(x+5)(x+5) - x^2 = 183$

$x^2 + 13x + 40 - x^2 = 183$

$13x + 40 = 183$

$\Rightarrow x = 11$

$AB = 11$ م

(13)

$$A = \sqrt{a+b}, B = \sqrt{a} + \sqrt{b}$$

$$A^2 = a+b, B^2 = a+2\sqrt{ab}+b$$

$$A^2 - B^2 = a+b - a - 2\sqrt{ab} - b$$

$$= -2\sqrt{ab} < 0$$

$$\Rightarrow A < B$$

$$\text{or } \sqrt{a+b} < \sqrt{a} + \sqrt{b}$$

$$A = \frac{a+b}{2}, B = \frac{2ab}{a+b}$$

کتاب لغز

$$A - B = \frac{a+b}{2} - \frac{2ab}{a+b}$$

$$= \frac{(a+b)^2 - 4ab}{2(a+b)}$$

$$= \frac{a^2 + 2ab + b^2 - 4ab}{2(a+b)}$$

$$= \frac{a^2 - 2ab + b^2}{2(a+b)} = \frac{(a-b)^2}{2(a+b)} \geq 0$$

$$\Rightarrow A > B$$

$$A = a+b, B = 2\sqrt{ab}$$

$$A^2 = (a+b)^2, B^2 = 4(ab)$$

$$A^2 - B^2 = (a+b)^2 - 4(ab)$$

$$= a^2 + 2ab + b^2 - 4ab$$

$$= a^2 - 2ab + b^2$$

$$A^2 - B^2 = (a-b)^2 \geq 0$$

$$\Rightarrow A > B$$

22
T. Waseem Tawidam

$$\textcircled{1} \frac{1}{2} \leq a \leq \frac{3}{2}, A = a^2 + 3$$

$$\frac{1}{4} \leq a^2 \leq \frac{9}{4} \Rightarrow \frac{1}{4} + 3 \leq a^2 + 3 \leq \frac{9}{4} + 3$$

$$\text{or } \frac{13}{4} < A < \frac{21}{4}$$

$$\textcircled{2} \frac{1}{4} < a < \frac{1}{2}, A = \frac{1}{a} - 2$$

$$4 > \frac{1}{a} > 2 \Rightarrow \frac{1}{4} > \frac{1}{a} - 2 > 0$$

$$2 > A > 0$$

$$\textcircled{3} 5 < a < 9, A = \sqrt{a} + 2$$

$$\sqrt{5} < \sqrt{a} < 3 \Rightarrow \sqrt{5} + 2 < \sqrt{a} + 2 < 5$$

$$\Rightarrow \sqrt{5} + 2 < A < 5$$

$$\textcircled{4} 6 < a < 11, A = \sqrt{a-2}$$

$$4 < a-2 < 9 \Rightarrow 2 < \sqrt{a-2} < 3$$

$$\text{or } 2 < A < 3$$

$$\textcircled{5} 1 \leq a \leq 2, A = (a-1)^2 - 3$$

$$0 \leq a-1 \leq 1 \Rightarrow 0 \leq (a-1)^2 \leq 1$$

$$\Rightarrow -3 \leq (a-1)^2 - 3 \leq -2$$

$$-3 \leq A \leq -2$$

$$A = \frac{1}{a} + \frac{1}{b}, B = \frac{1}{a+b}$$

$$B - A = \frac{1}{a+b} - \left(\frac{1}{a} + \frac{1}{b}\right)$$

$$= \frac{1}{a+b} - \frac{a+b}{ab}$$

$$= \frac{ab - (a+b)^2}{ab(a+b)}$$

$$= \frac{ab - a^2 - 2ab - b^2}{ab(a+b)}$$

$$= \frac{-a^2 - ab - b^2}{ab(a+b)} = \frac{-(a^2 + ab + b^2)}{ab(a+b)} < 0$$

$$\Rightarrow A > B$$

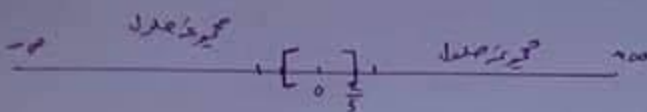
$$\frac{1}{a+b} < \frac{1}{a} + \frac{1}{b}$$

19

$$5) (2x+1)(-5x+2) < 0 \quad (12)$$

$$\text{h} \mid 2x+1 < 0 \Rightarrow x < -\frac{1}{2}$$

$$\text{h} \mid -5x+2 < 0 \Rightarrow x > \frac{2}{5}$$



$$x \in]-\infty; -\frac{1}{2}[\cup]\frac{2}{5}; +\infty[$$

$$6) (7-3x)(x+4) \geq 0$$



x	$-\infty$	-4	$\frac{7}{3}$	$+\infty$
$7-3x$	$+$	$-$	0	$-$
$x+4$	$-$	0	$+$	$+$
$(7-3x)(x+4)$	$-$	0	$+$	$-$

$$x \in [-4, \frac{7}{3}]$$

$$7) x^2+3x > 0$$

$$x(x+3) > 0$$

x	$-\infty$	-3	0	$+\infty$
x	$-$	$-$	0	$+$
$x+3$	$-$	0	$+$	$+$
$x(x+3)$	$+$	0	0	$+$

$$x \in]-\infty; -3[\cup]0; +\infty[$$

T. wa seem zaidan

$$6) 8 < a < 15 \quad (11) \quad A = \sqrt{a+1} - 1$$

$$9 < a+1 < 16 \Rightarrow 3 < \sqrt{a+1} < 4$$

$$\Rightarrow 2 < \sqrt{a+1} - 1 < 3$$

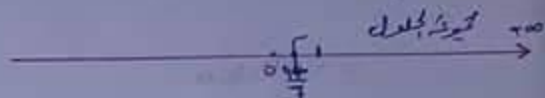
$$2 < A < 3$$

(23)

$$1) 3-2x \leq 5x-1$$

$$-5x-2x \leq -1-3$$

$$-7x \leq -4 \Rightarrow x \geq \frac{4}{7}$$



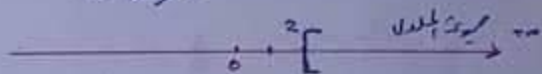
$$x \in [\frac{4}{7}; +\infty[$$

$$2) \frac{1}{6} - \frac{x}{3} \geq \frac{1}{2} - \frac{x}{2}$$

$$-\frac{x}{3} + \frac{x}{2} \geq \frac{1}{2} - \frac{1}{6}$$

$$\frac{x}{6} \geq \frac{2}{6}$$

$$\Rightarrow x \geq 2$$



$$x \in [2; +\infty[$$

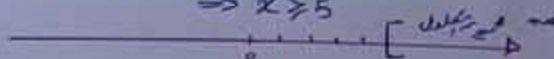
$$3) \frac{3+x}{4} \leq \frac{x-1}{2}$$

$$3+x \leq 2x-2$$

$$\Rightarrow x-2x \leq -2-3$$

$$\Rightarrow -x \leq -5$$

$$\Rightarrow x \geq 5$$

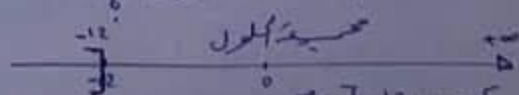


$$x \in [5; +\infty[$$

$$4) 5 + \frac{2}{3}x > \frac{1}{6}x - 1$$

$$\frac{2}{3}x - \frac{1}{6}x > -1-5$$

$$\frac{3}{6}x > -6 \Rightarrow x > -12$$



$$x \in]-12; +\infty[$$

6 III
 $(x-1)^2 > (2x+3)^2$

$(x-1)^2 - (2x+3)^2 = 0$
 $(x-1+2x+3)(x-1-2x-3) = 0$

$(3x+2)(-x-4) = 0$
 بـ $x = -4$ أو $x = -\frac{2}{3}$
 $P(x) = (3x+2)(-x-4)$ - فيكون x بين -4 و $-\frac{2}{3}$

x	$-\infty$	-4	$-\frac{2}{3}$	$+\infty$
-x-4	+	0	-	-
3x+2	-	-	0	+
P(x)	-	0	+	-

$[-4, -\frac{2}{3}]$ فيكون x بين -4 و $-\frac{2}{3}$

12
 $\frac{4x+1}{6-x} \leq -1$
 $x \neq 6$ المقام صفر

$\frac{4x+1}{6-x} + 1 \leq 0$

$\frac{4x+1+6-x}{6-x} \leq 0$

$P(x) = \frac{3x+7}{6-x} \leq 0$
 $\Rightarrow x \leq -\frac{7}{3}$

x	$-\infty$	$-\frac{7}{3}$	6	$+\infty$
3x+7	-	0	+	+
6-x	+	+	0	-
P(x)	-	0	+	-

$x \in]-\infty, -\frac{7}{3}] \cup]6, +\infty[$

5 9
 $F(x) = (x+3)^2 - 25$

ع نسر 1
 $F(x) = x^2 + 6x + 9 - 25$
 $F(x) = x^2 + 6x - 16$

ع حل 2
 $F(x) = (x+3-5)(x+3+5)$
 $= (x-2)(x+8)$

$F(x) = 0$
 $(x-2)(x+8) = 0$

بـ $x = 2$ أو $x = -8$

$F(x) = 11$

$F(x) = (x+3)^2 - 25 = 11$

$(x+3)^2 - 25 - 11 = 0$

$(x+3)^2 - 36 = 0$

$(x+3-6)(x+3+6) = 0$

$(x-3)(x+9) = 0$

$x-3 = 0 \Rightarrow x = 3$ بـ

$x+9 = 0 \Rightarrow x = -9$ أو

$F(x) = -16$ c

$x^2 + 6x - 16 = -16$

$x^2 + 6x = 0 \Rightarrow x(x+6) = 0$

بـ $x = 0$

أو $x = -6$

العدد الأول a ، الثاني a+1 ، الثالث a+2 ، الرابع a+3

$(a+1)(a+2) - a(a+3) = -2$

$a(a+3) - (a+1)(a+2) = -2$

$a^2 + 3a - (a^2 + 2a + a + 2) = -2$

$a^2 + 3a - a^2 - 3a - 2 = -2$

$\Rightarrow -2 = -2$

النتيجة صحيحة

$$= \frac{(\sqrt{5} + \sqrt{3})^2 (\sqrt{5} - \sqrt{3})}{2} \quad \boxed{4}$$

$$= \frac{5 + 2\sqrt{15} + 3 + 5 - 2\sqrt{15} + 3}{2} = \frac{16}{2} = 8$$

$$\left(x + \frac{1}{x}\right)^3 = 5^3 \quad \boxed{7}$$

$$= x^3 + 3(x^2)\left(\frac{1}{x}\right) + 3(x)\left(\frac{1}{x^2}\right) + \frac{1}{x^3} = 125$$

$$x^3 + 3x + \frac{3}{x} + \frac{1}{x^3} = 125$$

$$x^3 + 3\left(x + \frac{1}{x}\right) + \frac{10}{x^3} = 125$$

$$x^3 + \frac{1}{x^3} + 3(5) = 125$$

$$x^3 + \frac{1}{x^3} + 15 = 125$$

$$\rightarrow x^3 + \frac{1}{x^3} = 110$$

T. Waseem Zaidan

$$3x^4 - 4x^3 + 1 = (x-1)^2(2x^2 + (x+1)^2) \quad \boxed{8}$$

$$B = (x-1)^2(2x^2 + (x+1)^2)$$

$$= (x^2 - 2x + 1)(2x^2 + x^2 + 2x + 1)$$

$$= (x^2 - 2x + 1)(3x^2 + 2x + 1)$$

$$= 3x^4 + 2x^3 + x^2 - 6x^3 - 4x^2 - 2x + 3x^2 + 2x + 1$$

$$= 3x^4 - 4x^3 + 1 = A \Rightarrow A = B$$

$$(a+c+bd)^2 + (ad-bc)^2 = (a^2+b^2)(c^2+d^2) \quad \boxed{2}$$

$$= a^2c^2 + 2acbd + b^2d^2 + a^2d^2 - 2adbc + b^2c^2$$

$$= a^2c^2 + b^2c^2 + b^2d^2 + a^2d^2$$

$$= a^2(c^2+d^2) + b^2(c^2+d^2)$$

$$= (c^2+d^2)(a^2+b^2)$$

$$\textcircled{2} \quad x(3x-2) = 4 - 9x^2 \quad \boxed{3}$$

$$x(3x-2) + 9x^2 - 4 = 0$$

$$x(3x-2)(3x-2)(3x+2) = 0$$

$$x(3x-2)(x+3x+2) = 0$$

$$(3x-2)(4x+2) = 0$$

$$\text{or } 3x-2=0 \Rightarrow x = \frac{2}{3}$$

$$\text{or } 4x+2=0 \Rightarrow x = -\frac{1}{2}$$

$$\left\{-\frac{1}{2}, \frac{2}{3}\right\}$$

$$\textcircled{3} \quad \frac{4}{x-1} = x-1$$

$$x=1 \text{ is not a solution}$$

$$(x-1)^2 = 4 \Rightarrow (x-1)^2 - 4 = 0$$

$$(x-1-2)(x-1+2) = 0$$

$$(x-3)(x+1) = 0$$

$$\text{or } x-3=0 \Rightarrow x=3$$

$$\text{or } x+1=0 \Rightarrow x=-1$$

$$\{-1, 3\}$$

$$4) \quad \frac{x^2}{x-1} = 4$$

$$x \neq 1$$

$$x^2 - 4(x-1) = 0$$

$$x^2 - 4x + 4 = 0$$

$$(x-2)^2 = 0$$

$$\Rightarrow x = 2$$

$$\{2\}$$

$$\frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}} + \frac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}}$$

$$\frac{(\sqrt{5} + \sqrt{3})(\sqrt{5} + \sqrt{3})}{(\sqrt{5} - \sqrt{3})(\sqrt{5} + \sqrt{3})} + \frac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}} \times \frac{(\sqrt{5} - \sqrt{3})}{(\sqrt{5} - \sqrt{3})}$$

$$\frac{(\sqrt{5} + \sqrt{3})^2}{5-3} + \frac{(\sqrt{5} - \sqrt{3})^2}{5-3}$$