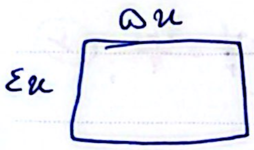
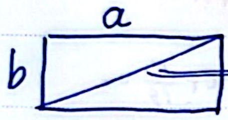


$$\frac{S_{\text{هاشورخورده}}}{S_{\text{اولیه}}}=\frac{\left(\frac{1+\sqrt{5}}{2}\times 4x\right)\times 4x}{5x\times 4x}=\frac{2+2\sqrt{5}}{5}=0.4+0.4\sqrt{5}$$ ①

$$=\boxed{0.4(1+\sqrt{5})}$$



$\sqrt{a^2+b^2}=$ قطر

② $$\frac{\sqrt{a^2+b^2}}{a}=\frac{1+\sqrt{5}}{2}\xrightarrow{\text{توان ۲}}\frac{a^2+b^2}{a^2}=\left(\frac{1+\sqrt{5}}{2}\right)^2$$

$$\Rightarrow 1+\frac{b^2}{a^2}=\frac{6+2\sqrt{5}}{4}\Rightarrow\left(\frac{b}{a}\right)^2=\frac{6+2\sqrt{5}}{4}-1$$

$$\Rightarrow\left(\frac{b}{a}\right)^2=\frac{2+2\sqrt{5}}{4}=\frac{1+\sqrt{5}}{2}\Rightarrow\boxed{\left(\frac{a}{b}\right)^2=\frac{2}{1+\sqrt{5}}}$$

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③ $$3a+\sqrt{2a^2+4a}=2\Rightarrow\sqrt{2a^2+4a}=2-3a\xrightarrow{\text{توان ۲}}2a^2+4a=4-12a+9a^2$$

$$\Rightarrow 7a^2-16a+4=0\Rightarrow\Delta=(-16)^2-4(7)(4)=144\Rightarrow\sqrt{\Delta}=\sqrt{144}=12$$

$$\Rightarrow a=\frac{16\pm12}{\underbrace{2(7)}_{14}}\Rightarrow\begin{cases}a=2\rightarrow \text{غ ق ق}\\ a=\frac{2}{7}\Rightarrow\frac{a+1}{a}=1+\frac{1}{a}=1+\frac{7}{2}=\boxed{4.5}\end{cases}$$

← صدق در رادیکال را منفی می‌کند

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④ $$\frac{\sqrt{x+1}}{\sqrt{x-1}+3}-\frac{\sqrt{x+1}}{3-\sqrt{x-1}}=\frac{x-1}{\sqrt{x-1}}\Rightarrow\sqrt{x+1}\left(\frac{3-\sqrt{x-1}-3-\sqrt{x-1}}{(3+\sqrt{x-1})(3-\sqrt{x-1})}\right)=\sqrt{x-1}$$

$$\Rightarrow\sqrt{x+1}\left(\frac{-2\cancel{\sqrt{x-1}}}{9-(x-1)}\right)=\cancel{\sqrt{x-1}}\Rightarrow\frac{-2\sqrt{x+1}}{10-x}=1\Rightarrow 2\sqrt{x+1}=x-10\Rightarrow 4(x+1)=x^2-20x+100$$

$$\Rightarrow x^2-24x+96=0\Rightarrow\Delta=(-24)^2-4(1)(96)=192\Rightarrow x=\frac{24\pm\sqrt{192}}{2(1)}=12\pm4\sqrt{3}$$

$-$ ← غ ق ق

$$\Rightarrow\boxed{12+4\sqrt{3}}$$

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⑤ $$\frac{1}{\sqrt{2-x}+2}-\frac{1}{2-\sqrt{2-x}}=\frac{2-x}{5\sqrt{2-x}}\Rightarrow\frac{2-\sqrt{2-x}-\sqrt{2-x}-2}{(2+\sqrt{2-x})(2-\sqrt{2-x})}=\frac{2-x}{5\sqrt{2-x}}$$

$$\Rightarrow\frac{-2\sqrt{2-x}}{4-(2-x)}=\frac{2-x}{5\sqrt{2-x}}\Rightarrow-10(2-x)=(2+x)(2-x)\Rightarrow-20+10x=4-x^2$$

$$\Rightarrow x^2+10x-24=0\Rightarrow(x+12)(x-2)=0\Rightarrow\begin{cases}x=-12\\ x=2\rightarrow \text{غ ق ق}\end{cases}$$

(مخرج کسر را صفر می‌کند)

⇒ معادله ریشه‌ی ۱ ی + ندارد

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$$\frac{1}{x^2}+\frac{1}{(1-x)^2}=\frac{160}{9}\Rightarrow\frac{(1-x)^2+x^2}{x^2(1-x)^2}=\frac{160}{9}\Rightarrow\frac{2x^2-2x+1}{(x-x^2)^2}=\frac{160}{9}$$

$$\Rightarrow\frac{2(x^2-x)+1}{(x^2-x)^2}=\frac{160}{9}\xrightarrow{x^2-x=t}\frac{2t+1}{t^2}=\frac{160}{9}\Rightarrow 160t^2=18t+9$$

$$\Rightarrow 160t^2-18t-9=0\Rightarrow t=\frac{18\pm\sqrt{(-18)^2-4(160)(-9)}}{2\times160}=\frac{18\pm6\sqrt{9+160}}{2\times160}$$

$$\Rightarrow t=\frac{18\pm6\times13}{2\times160}\Rightarrow\begin{cases}t=-\frac{3}{16}\Rightarrow x^2-x=-\frac{3}{16}\Rightarrow x^2-x+\frac{3}{16}=0\\ t=\frac{3}{10}\Rightarrow x^2-x=\frac{3}{10}\Rightarrow x^2-x-\frac{3}{10}=0\end{cases}$$

$$\Rightarrow 1+1=\boxed{2}$$

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$$\sqrt{x+\sqrt{-x^3+4x^2+25x-100}}+\sqrt{x^2+\sqrt{-x^2+6x-8}}=x+2$$

$$-x^2+6x-8\geq0\Rightarrow x^2-6x+8\leq0\Rightarrow(x-2)(x-4)\leq0\Rightarrow 2\leq x\leq4\ (I)$$

$$-x^3+4x^2+25x-100\geq0\Rightarrow x^2(-x+4)+25(x-4)\geq0\Rightarrow(x-4)(25-x^2)\geq0$$

$\Rightarrow x\leq-5$ یا $4\leq x\leq5\ (II)$

$$(II),(I)\Rightarrow x=4\Rightarrow\sqrt{4+\sqrt{0}}+\sqrt{16+\sqrt{0}}=4+2\Rightarrow 2+4=4+2\ ✓$$

$$\Rightarrow \boxed{x=4}$$

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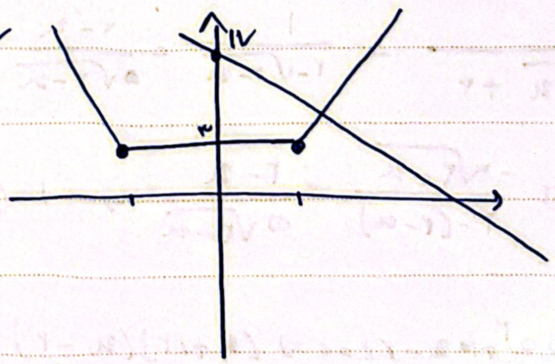
$y=|x+2|+|x-1|\qquad 3y+x=17$

$A(2,5)\quad B(-4,7)$

$$AB=\sqrt{(2-(-4))^2+(5-7)^2}=\sqrt{40}=\boxed{2\sqrt{10}}$$



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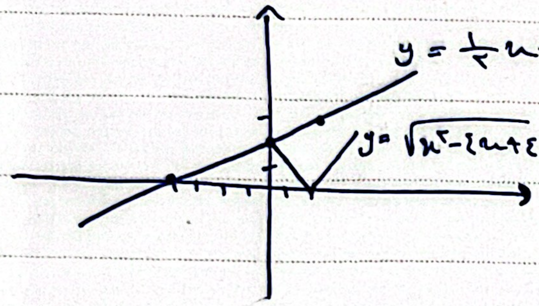
$$y = \frac{1}{2}x + 2 \Rightarrow \begin{array}{c|ccc} x & 0 & -4 & 2 \\ y & 2 & 0 & 3 \end{array}$$

$$y = \sqrt{x^2 - 4x + 4} \Rightarrow \sqrt{(x-2)^2} \Rightarrow |x-2| = y$$



$$\Rightarrow S_{\Delta} = \frac{1}{2} \times 2 \times 2 = \boxed{2}$$

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بهروز $= x \Rightarrow \frac{1}{x}$

فرهاد $= x + 9 \Rightarrow \frac{1}{x+9}$

$$\Rightarrow \frac{1}{x} + \frac{1}{x+9} = \frac{1}{20}$$

$$\Rightarrow \frac{x + x + 9}{x(x+9)} = \frac{1}{20} \Rightarrow \frac{2x+9}{x^2+9x} = \frac{1}{20} \Rightarrow 40x + 180 = x^2 + 9x \Rightarrow$$

$$x^2 - 31x = 180 \Rightarrow x(x-31) = 180 \Rightarrow \boxed{x = 36}$$