$2x^2-2x+1$

$$\frac{x^2+1-2x+x^2}{x^2(1-x)^2} = \frac{140}{9}$$

$$\frac{1}{(x-1)^2} = \frac{140}{9} - \frac{1}{x^2} = \frac{140x^2-9}{9x^2} \to (x-1)^2 = \frac{9x^2}{140x^2-9}$$

۶ — ۰٫۵

$x+2 \ge 0 \to x \ge -2$ ①

$-x^3+4x^2+25x-100 \ge 0$ ③

-5		4		5	
+	-	+		-	

$$\frac{-x^3+4x^2+25x-100}{-x^2+25} \quad (x-4)$$

$-x^2+6x-8 \ge 0 \to x^2-6x+8 \le 0 \to (x-2)(x-4) \le 0$ ④ (2, 4: + - +)

$x \ge 0$ ②

$\longrightarrow$ ① ∩ ② ∩ ③ ∩ ④ $= \{4\}$

۷ — ۲

$-2x-1 \quad | -2 \quad 3 \quad | 1 \quad x+1$

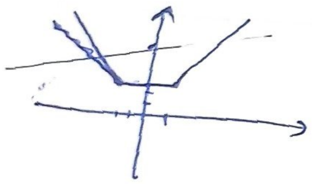
$y = -\frac{x}{3} + \frac{17}{3}$

$17 - x = 6x + 3$

$14 = 7x$

$x = 2$

$y = 5$



$B(2,5) \quad A(-4,7) \quad \to \boxed{d = 2\sqrt{10}}$

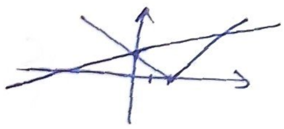
$-2x - 3 = 17 - x$

$-20 = x$ $\quad (-4, 7)$

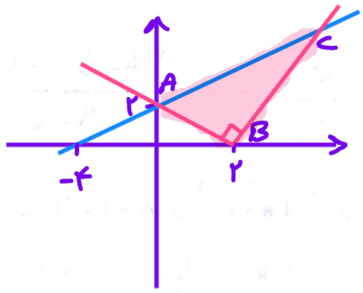
۸ — ۲

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

$\frac{1}{2}x + 2 = x - 2 \to x = 8$



$A(0, 2) \quad B(8, 6) \quad (2, 0)$



	0	2	
24	8	6	0
12	2	0	0
0	2	6	

$S = \frac{24+12-6}{2} =$ ~~15~~ $\boxed{12}$

۹ — ۱٫۵

~~[illegible]~~	$x+9$	$\frac{1}{x+9}$
~~[illegible]~~	x	$\frac{1}{x}$

$$\frac{1}{x+9} + \frac{1}{x} = \frac{1}{20} \to 40x + 180 = x^2 + 9x$$

$x^2 - 31x - 180 = 0$

$(x-36)(x+5) = 0$

$\boxed{x = 36}$

$x + 9 = 45$

$x = 36$

دو ۳۶ ساعت

۱۰ — ۲

شایان رومی نژاد

۱۷٫۲۵

(۲)

$5x$ (rectangle, sides $5x$ and $4x$)

$\frac{5x+\alpha}{4x} = \frac{1+\sqrt5}{2}$ $\quad 5x+\alpha = 2x+2\sqrt5 x \to \alpha = (2\sqrt5-3)x$

$\to \frac{\alpha}{x} = \boxed{2\sqrt5-3}$

$\frac{(5x+\alpha)(4x)}{(5x)(4x)} = \frac{\alpha}{5x}+1 = ? = \frac{2\sqrt5-3}{5}+1 = \boxed{\frac{2\sqrt5+2}{5}}$ ✓ ۱

(rectangle, sides x, y, diagonal) $\frac{y}{x} = \frac{1+\sqrt5}{2}$ $\quad z^2+x^2=y^2 = \frac{x^2(6+2\sqrt5)}{4} = \frac{x^2(3+\sqrt5)}{2}$

$\left(\frac{x}{z}\right)^2 = ? = \frac{\sqrt5-1}{2}$ ✓ $\to z^2 = x^2\left(\frac{3+\sqrt5}{2}\right)-1 = x^2\left(\frac{1+\sqrt5}{2}\right) \to \left(\frac{x}{z}\right)^2 = \frac{2}{1+\sqrt5}\times\frac{\sqrt5-1}{\sqrt5-1} = \boxed{\frac{\sqrt5-1}{2}}$ ۲

(۲)

$9a^2+4-12a = 2a^2+4a \quad 7a^2-16a+4=0 \Rightarrow (a-\frac{2}{7})(a-\frac{14}{7})=0$ → $a=\frac{2}{7}$, $a=2$ غ ق ق

$2a^2+4a \geq 0 \quad a(a+2)\geq 0$ (−۲ ۰ : + − +) → a ۳

~~$2a^2+4a = 4+9a^2-12a$~~

$\sqrt{2a^2+4a} = 2-3a$

$a=2 \to$ ~~$\frac{a+1}{a} = \frac{3}{2}$~~

۲ جواب اینو چقدر ملینه ×

۱٫۷۵

$a=\frac{2}{7} \to \frac{a+1}{a} = \frac{\frac{9}{7}}{\frac{2}{7}} = \frac{9}{2}$ ✓

$\sqrt{x+1}=t \quad \sqrt{x-1}=z \quad tz=\sqrt{x^2-1}$

(۹۶ | ۲, ۴۸ | ۲, ۲۴ | ۳, ۸)

$\frac{t}{z+3} - \frac{t}{3-z} = \frac{z^2}{z} \to \frac{3t-tz-tz-3t}{9-z^2} = z \Rightarrow \frac{-2tz}{9-z^2} = z$ ۴

۱٫۷۵

$\to 2t = z^2-9 \to 2\sqrt{x+1} = x-1-9 = x-10 \geq 0 \to x\geq 10$ جواب رادیکال!

$4x+4 = x^2+100-20x$

$\to x^2-24x+96=0 \to$ ~~$(x\ \ )(x\ \ )$~~ $\Delta>0$, $\alpha+\beta>0$, $\alpha\beta>0$ → ~~دو ریشه~~ دو ریشه‌ی مثبت دارد

$\to x = 12 \mp 4\sqrt3 \to$ $\boxed{12+4\sqrt3 \quad \text{ق ق}}$

$\frac{2-\sqrt{2-x} \quad -\sqrt{2-x}-2}{3-2+x} = \frac{2-x}{5\sqrt{2-x}} = \frac{-2\sqrt{2-x}}{2+x} = \frac{2-x}{5\sqrt{2-x}} \to -2x^2 = -10(2-x) = -20+10x$ ۵

$x^2+10x-24=0 \quad (x-2)(x+12)=0 \to x=2$ × ، $x=-12$ → ۱ ریشه‌ی مثبت

ریشه مخرجه!

هیچ ریشه

۱٫۷۵

$$\frac{1-2x+x^2+x^3}{(x(1-x))^2}=\frac{2(x^2-x)+1}{(x-x^2)^2}=\frac{140}{9}\xrightarrow{x^2-x=t}\frac{2t+1}{t^2}=\frac{140}{9}$$

$$140t^2-18t-9=0\xrightarrow{\text{روش}}\begin{cases}t=0,3\rightarrow x^2-x-0,3=0\xrightarrow{\Delta>0}\boxed{S=1}\\ t=-\frac{3}{14}\rightarrow x^2-x+\frac{3}{14}=0\xrightarrow{\Delta>0}\boxed{S=1}\end{cases}$$

$$\boxed{S=2}$$