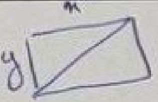
$\frac{5+a}{4}=\frac{\sqrt5+1}{2}$ $10+2a=2\sqrt5+2 \to a=2\sqrt5-3$ $\frac{2+2\sqrt5}{4}$ $\frac{1+\sqrt5}{2}$

$\frac{S_2}{S_1}=\frac{(2\sqrt5+2)^4}{5\times 4}=\boxed{\frac{2\sqrt5+2}{5}}$ 1



$\frac{\sqrt{x^2+y^2}}{x}=\frac{1+\sqrt5}{2} \longrightarrow \frac{x^2+y^2}{x^2}=\frac{6+2\sqrt5}{4} \to 1+\frac{y^2}{x^2}=\frac{3+\sqrt5}{2} \to \frac{y^2}{x^2}=\frac{3+\sqrt5}{2}-1$

$\frac{y^2}{x^2}=\frac{3+\sqrt5-2}{2}=\frac{1+\sqrt5}{2} \to \left(\frac{y}{x}\right)^2=\frac{1+\sqrt5}{2} \to \boxed{\left(\frac{x}{y}\right)^2=\frac{2}{1+\sqrt5}}$ 2

$2a^2+4a\geq 0$ $\begin{cases} a=0 \\ a=-2 \end{cases}$ $(-\infty,-2]\cup[0,+\infty)$ ① $2-3a\geq 0$ $2\geq 3a$ $\frac{2}{3}\geq a$ ②

① $\cap$ ② $=(-\infty,-2]\cup[0,\frac{2}{3}]$

$2a^2+4a=4+9a^2-12a$ $7a^2-16a+4$ $\begin{cases} a=2 \;\times \\ a=\frac{2}{7}\;\checkmark \end{cases}$ $\frac{a+1}{a}=\frac{\frac{2}{7}+1}{\frac{2}{7}}=\frac{\frac{9}{7}}{\frac{2}{7}}=\boxed{\frac{9}{2}}$ 3

$(\sqrt{x+1})(\sqrt{x-1})(3-\sqrt{x-1})-(\sqrt{x+1})(\sqrt{x-1})(\sqrt{x-1}+3)=(x-1)(\sqrt{x-1}+2)(3-\sqrt{x-1})$

$3x-x\sqrt{x-1}-3+\sqrt{x-1}-x\sqrt{x-1}+x\sqrt{x-1}-3x+\sqrt{x-1}+3=-x^2+11x-10$

$\boxed{x=12+4\sqrt3\;\checkmark}$

$x=12-4\sqrt3\;\times$ 4

$x+1\geq 0$ $x\geq -1$ ①

$x-1\geq 0$ $x\geq 1$ ② ① $\cap$ ② $\boxed{x\geq 1}$

$2-x\geq 0$ $\boxed{2\geq x}$

$2-\sqrt{2-x}\neq 0$ $4\neq 2-x$ $\boxed{x\neq -2}$ $\sqrt{x+4}\neq 0$ $\boxed{x\neq 2}$

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

$10\sqrt{2-x}+5x-10+5x-10-10\sqrt{2-x}=4-x^2$ $x^2+10x-24=0$

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$(x+12)(x-2)\begin{cases} x=-12\;\checkmark \\ x=2\;\times \quad غ ق ق \end{cases}$

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

$160\alpha^2=18\alpha+9 \longrightarrow \alpha=\frac{3}{10} \longrightarrow x^2-x=\frac{3}{10} \left\langle \begin{array}{l} \frac{1+\sqrt{2.2}}{2} \\ \frac{1-\sqrt{2.2}}{2} \end{array} \right. \xrightarrow{+} 1$ ۶

$\alpha=-\frac{3}{16} \longrightarrow x^2-x=-\frac{3}{16} \left\langle \begin{array}{l} \frac{1+\frac12}{2} \\ \frac{1-\frac12}{2} \end{array} \right. \xrightarrow{+} 1$

$\longrightarrow 1+1=2$

$-x^3+4x^2+25x-100\geq 0 \left\langle \begin{array}{l} x_1=-5 \\ x_2=4 \\ x_3=5 \end{array} \right.$ $\quad (-5,\ 4,\ 5:\ +\ -\ +\ -) \quad (-\infty,-5]\cup[4,5]$ ①

$-x^2+6x-8\geq 0 \left\langle \begin{array}{l} x=2 \\ x=4 \end{array} \right.$ $\quad (2,\ 4:\ -\ +\ -) \quad [2,4]$ ② $\qquad x+2\geq 0 \quad x\geq -2$ ③ ۷

$① \cap ② \cap ③=\{4\}$ جواب ①

$\frac{17-x}{3}=|x+2|+|x-1|$

$(-2,\ 1)$

$\frac{17-x}{3}=-x-2+1-x$, $17-x=-6x-3$, $x=-4 \quad y=7$

$\frac{17-x}{3}=x+2+1-x$, $17-x=9$, $x=8\ \times$ ۸

$\frac{17-x}{3}=x+2+x-1$, $17-x=6x+3$, $x=2 \quad y=5$

فاصله $\longrightarrow \sqrt{(2+4)^2+(5-7)^2}=2\sqrt{10}$

(2)

$\frac12 x+2=2-x$, $x=0$, $y=2$ $\qquad$ $\frac12 x+2=x-2$, $x=8$, $y=6$

$S_1=\frac{2\times 3}{2}=3$, $S_2=\frac{6\times 3}{2}=9$ $\Big\}\ 3+9=12$ ۹

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

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

$(x+9)20+20x=x^2+9x \quad 20x+180+20x=x^2+9x \quad x^2-31x-180=0 \quad (x-36)(x+5)=0$

$x=36\ \checkmark \qquad x=-5\ \times$ ۱۰