Решението на даденото неравенство е $x \in \left[-\frac{13}{4};-2\right) \cup \left(-2;-\frac{7}{6}\right]$.

д) $\left|\frac{2x+3}{x^2-5x+6}\right| \geqq -3;\ x^2-5x+6 \neq 0;\ x \neq 2;\ x \neq 3;$

$\left|\frac{2x+3}{x^2-5x+6}\right| \geqq 0$ е изпълнено винаги, защото има знак на модул при $x \neq 2$ и $x \neq 3$ и следователно даденото неравенство е изпълнено за всяко $x \neq 2$ и $x \neq 3$.

Стр. 60, Зад. 5.

а) $\left|\begin{array}{l} \frac{3x-1}{2-x} > 0 \\ x^2-5x+6 \geqq 0 \end{array}\right. \to \left|\begin{array}{l} (3x-1)(2-x) > 0;\ x_1 = \frac{1}{3};\ x_2 = 2 \\ D_1 : x \in \left(\frac{1}{3};2\right) \end{array}\right.$

Сечението на D_1 и D_2 е решението: $x \in \left(\frac{1}{3};2\right)$.

$x^2-5x+6=0;\ x_1=3;\ x_2=2;\ D_2 : x \in (-\infty;2] \cup [3;+\infty)$

б) $-3 < \frac{x^2+x-2}{x^2-x+1} < 0 \to \left|\begin{array}{l} (1)\ -3 < \frac{x^2+x-2}{x^2-x+1} \\ (2)\ \frac{x^2+x-2}{x^2-x+1} < 0 \end{array}\right.$

Решение на (1): $\frac{x^2+x-2}{x^2-x+1}+3>0;\ \frac{x^2+x-2+3x^2-3x+3}{x^2-x+1}>0;$

$\frac{4x^2-2x+1}{x^2-x+1}>0;\ (4x^2-2x+1)(x^2-x+1)>0;$

$4x^2-2x+1=0 \to D<0$ и $4x^2-2x+1>0$ за $\forall x$;

$x^2-x+1>0$ за $\forall x$ от $D<0$. Сл. решението на (1) е $D_1 : x \in (-\infty;+\infty)$

Решение на (2): $\frac{x^2+x-2}{x^2-x+1}<0;\ (x^2+x-2)(x^2-x+1)<0;$

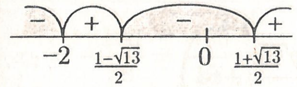
$x^2+x-2=0 \to x_1=1;\ x_2=-2;\ x \in (-2;1)$ и $x^2-x+1>0$ за $\forall x$.

Решението на системата е $x \in (-2;1)$

в) $\left|\begin{array}{l} \left|\frac{x^2-1}{x+2}\right| < 1 \to -1 < \frac{x^2-1}{x+2} < 1 \\ x-2<0 \to x<2 \end{array}\right. \to$

$\left|\begin{array}{l} -1 < \frac{x^2-1}{x+2} \to \frac{x^2-1}{x+2}+1>0 \to \frac{x^2-1+x+2}{x+2}>0 \\ \frac{x^2-1}{x+2} < 1 \to \frac{x^2-1}{x+2}-1<0;\ \frac{x^2-1-x-2}{x+2}<0 \end{array}\right. \to$

$\left|\begin{array}{l} \frac{x^2+x+1}{x+2} > 0 \to x^2+x+1>0 \text{ за } \forall x \text{ от } D<0;\ x+2>0;\ x>-2 \\ \frac{x^2-x-3}{x+2} < 0 \to (x^2-x-3)(x+2)<0;\ x^2-x-3=0; \end{array}\right.$



$x_{1,2} = \frac{1 \pm \sqrt{1+12}}{2} = \frac{1 \pm \sqrt{13}}{2}$

$x \in (-\infty;-2) \cup \left(\frac{1-\sqrt{13}}{2};\frac{1+\sqrt{13}}{2}\right)$, което в сечението с $x>-2$ има решение $\left(\frac{1-\sqrt{13}}{2};\frac{1+\sqrt{13}}{2}\right)$. Но $x<2$ (от II уравнение на системата) и сл. $x \in \left(\frac{1-\sqrt{13}}{2};2\right)$

г) $\left|\begin{array}{l} |x^2-5x|>6 \\ x^3-2x^2-x>-2 \end{array}\right. \to \begin{array}{l} x^2-5x<-6 \\ x^2-5x>6 \\ x^3-2x^2-x+2>0 \end{array} \to$

$x^2-5x+6<0 \quad \to x_1=2;\ x_2=3;\ x \in (2;3) \to D_1$

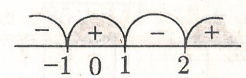
$x^2-5x-6>0 \quad \to x_{1,2} = \frac{5 \pm \sqrt{25+24}}{2};\ x_1=6;\ x_2=-1;$

$x \in (-\infty;-1) \cup (6;+\infty) \to D_2$

$x^2(x-2)-(x-2)>0 \quad \to (x-2)(x^2-1)>0;$

$(x-2)(x-1)(x+1)>0;$

$x \in (-1;1) \cup (2;+\infty) \to D_3$



Сечението на решенията на обединението от решенията на първите две неравенства с третото е решение на системата.

$(D_1 \cup D_2) \cap D_3 = (2;3) \cup (6;+\infty)$

д) $\left|\begin{array}{l} x^4+2x^3-4x^2-5x+6 \geqq 0 \\ \frac{x}{2-x} \geqq 0 \end{array}\right.$

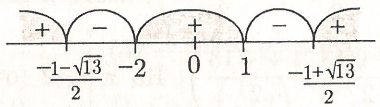
$x^4+2x^3-4x^2-5x+6 \geqq 0;\ (x-1)(x+2)(x^2+x-3) \geqq 0;$

$x-1=0;\ x=1;\ x+2=0;\ x=-2;$

	1	2	−4	−5	6
1	1	3	−1	−6	0
−2	1	1	−3	0	

$x^2+x-3=0; x_{1,2}=\dfrac{-1\pm\sqrt{1+12}}{2}=\dfrac{-1\pm\sqrt{13}}{2}$

$D_1: x\in\left(-\infty;\dfrac{-1-\sqrt{13}}{2}\right]\cup[-2;1]\cup\left[\dfrac{-1+\sqrt{13}}{2};+\infty\right)$

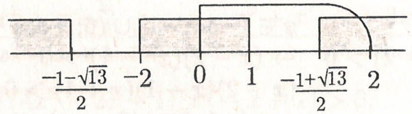


$\dfrac{x}{2-x}\geqq 0;$

$\left|\begin{array}{l} x(2-x)\geqq 0\\ x\neq 2\end{array}\right.$

$x=0; 2-x=0; x=2$ $D_2: x\in[0;2)$

Сечението на D_1 и D_2 е решението $x\in[0;1)\cup\left[\dfrac{1+\sqrt{13}}{2};2\right)$



Стр. 60, Зад. 6.

	v	s	t
отиване	x	180	$\dfrac{180}{x}$
връщане	$x+5$	180	$\dfrac{180}{x+5}$

$;\ \dfrac{24}{60}=\dfrac{2}{5}$

$\dfrac{180}{x}+\dfrac{180}{x+5}-8+\dfrac{2}{5}\leqq 0;\ \dfrac{180}{x}+\dfrac{180}{x+5}-\dfrac{38}{5}\leqq 0|:2\rightarrow\dfrac{90}{x}+\dfrac{90}{x+5}-\dfrac{19}{5}\leqq 0;$

$\dfrac{450(x+5)+450x-19x(x+5)}{5x(x+5)}\leqq 0;$

$\dfrac{450x+2250+450x-19x^2-95x}{5x(x+5)}\leqq 0;$

(1) $\dfrac{-19x^2+805x+2250}{5x(x+5)}\leqq 0;\ -19x^2+805x+2250=0;$

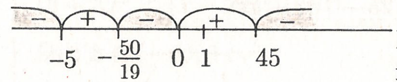
$19x^2-805x-2250=0;$

$x_{1,2}=\dfrac{805\pm\sqrt{805^2+4.19.2250}}{2.19}=\dfrac{805\pm 905}{38}; x_1=45;$

$x_2=-\dfrac{100}{38}=\dfrac{-50}{19}$. От (1) получаваме

$\left|\begin{array}{l}(-19x^2+805x+2250)5x(x+5)\leqq 0\\ x\neq 0; x\neq -5; x>0\end{array}\right.$

$x=0; x+5=0; x=-5$. Но $x>0$ и решението е $x\geqq 45$.



Най-малката стойност е 45 km/h за връщане.

Стр. 64, Зад. 1.

а) $\sqrt{5-2x}<6x-1;$

$\left|\begin{array}{l}5-2x<(6x-1)^2\\ 5-2x\geqq 0\\ 6x-1>0\end{array}\right.\rightarrow\left|\begin{array}{l}5-2x<36x^2-12x+1\\ -2x\geqq -5\\ 6x>1\end{array}\right.\rightarrow$

$\left|\begin{array}{l}36x^2-10x-4>0\\ x\leqq\dfrac{5}{2}\rightarrow D_1: x\in\left(-\infty;\dfrac{5}{2}\right]\\ x>\dfrac{1}{6}\rightarrow D_2: x\in\left(\dfrac{1}{6};\infty\right)\end{array}\right.$

$36x^2-10x-4>0; 36x^2-10x-4=0;$

$18x^2-5x-2=0; x_{1,2}=\dfrac{5\pm\sqrt{25+144}}{36}=\dfrac{5\pm\sqrt{169}}{36}=\dfrac{5\pm 13}{36};$

$x_1=\dfrac{1}{2}; x_2=-\dfrac{8}{36}=-\dfrac{2}{9}.$

$D_3: x\in\left(-\infty;-\dfrac{2}{9}\right)\cup\left(\dfrac{1}{2};+\infty\right).$

Сечението на D_1, D_2 и D_3 е решението $x\in\left(\dfrac{1}{2};\dfrac{5}{2}\right].$

б) $\sqrt{2x+14x}>3+x;$

$\left|\begin{array}{l}2x+14>(x+3)^2\\ x+3\geqq 0\end{array}\right.\rightarrow\left|\begin{array}{l}2x+14>x^2+6x+9\\ x\geqq -3\end{array}\right.\rightarrow$

$\left|\begin{array}{l}x^2+4x-5<0\\ x\geqq -3\end{array}\right.\cup\left|\begin{array}{l}x+3<0\\ 2x+14\geqq 0\end{array}\right.\rightarrow$