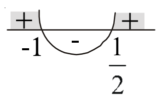
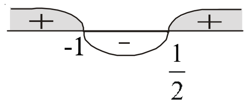
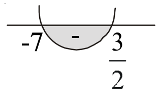
Стр.39, Зад.9. $2x^2+x-1>0;\ 2x^2+x-1=0;\ x_1=-1;\ x_2=\dfrac{1}{2}$

 $x\in[-\infty;-1)\cup\left(\dfrac{1}{2};+\infty\right)$ или 

Стр.39, Зад.10. $2x^2+11x-21<0;\ 2x^2+11x-21=0;$

$x_{1,2}=\dfrac{-11\pm\sqrt{121+168}}{4}=\dfrac{-11\pm17}{4};\ x_1=\dfrac{3}{2};\ x_2=-7;$

 $x\in\left(-7;\dfrac{3}{2}\right)$.

Стр.39, Зад.11. $9x^2-12x+4\le0;\ 9x^2-12x+4=0;$

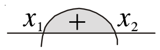
$x_{1,2}=\dfrac{6\pm\sqrt{36-36}}{9}=\dfrac{3}{2};\ 9\left(x-\dfrac{3}{2}\right)^2\le0$. Има решение само $x=\dfrac{3}{2}$.

Стр.39, Зад.12. $49x^2+42x+9>0;\ (7x+3)^2>0$. Решение е всяко x от $(-\infty;+\infty)$ без $x=-\dfrac{3}{2}$ или $x\in\left(-\infty;-\dfrac{3}{2}\right)\cup\left(-\dfrac{3}{2};+\infty\right)$.

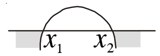
Стр.39, Зад.13. $36x^2-60x+25<0;\ (6x-5)^2<0$ - няма решение, защото $(6x-5)^2>0$ за всяко x.

Стр.39, Зад.14. $81x^2+36x+6\ge0;\ D<0;$ Следователно $x\in(-\infty;+\infty)$.

Стр.39, Зад.15. $-x^2+5x+14\ge0;\ -x^2+5x+14=0;\ x^2-5x-14=0$

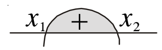
 $x_1=7;\ x_2=-2;\ x\in(-2;7)$.

Стр.39, Зад.16. $-2x^2+11x+63<0;\ 2x^2-11x-63=0;$

$x_{1,2}=\dfrac{11\pm\sqrt{121+504}}{4}=\dfrac{11\pm\sqrt{625}}{4}=\dfrac{11\pm25}{4};\ x_2=9;\ x_1=-\dfrac{7}{2}$ 

$x\in\left(-\infty;-\dfrac{7}{2}\right)\cup(9;+\infty)$.

Стр.39, Зад.17. $-3x^2+7x-2\ge0;\ 3x^2-7x+2=0;$

$x_{1,2}=\dfrac{7\pm\sqrt{49-24}}{6}=\dfrac{7\pm\sqrt{25}}{6};\ x_2=2;\ x_1=\dfrac{1}{3};\ x\in\left(\dfrac{1}{3};2\right)$ 

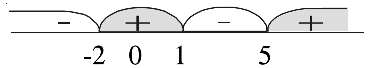
Стр.39, Зад.18. $-9x^2+42x-49\ge0;\ -(3x-7)^2\ge0$. Решение е $x=\dfrac{7}{3}$.

Стр.39, Зад.19. $-25x^2+30x-9<0;\ -(5x-3)^2<0;\ x\ne\dfrac{3}{5}$ или

$x\in\left(-\infty;\dfrac{3}{5}\right)\cup\left(\dfrac{3}{5};+\infty\right)$.

Стр.39, Зад.20. $-9x^2+12x-11>0;\ 9x^2-12x+11=0;\ D<0$ - няма решение.

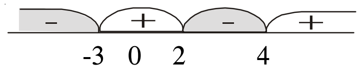
Стр.42, Зад.1. $(x-1)(x+2)(x-5)\ge0;\ x-1=0;\ x=1;\ x+2=0;$

$x=-2;\ x-5=0;\ x=5;$ 

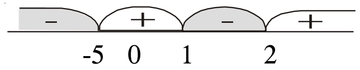
Избираме числото 0 от II интервал и пресмятаме:

$(0-1)(0+2)(0-5)=-1.2(-5)=10$. Знакът $+$ на $(+10)$ нанасяме във II интервал, а в съседните сменяме знаците. Интервалите, в които знаците съвпадат с този на неравенството са решения $x\in[-2;1]\cup[5;+\infty)$.

Стр.42, Зад.2. $(\overset{-}{x-2})(\overset{+}{x+3})(\overset{-}{x-4})<0;\ x=2;\ x=-3;\ x=4$

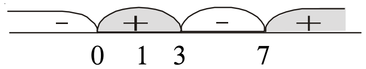
 $x\in-(-\infty;-3)\cup(2;4)$.

Стр.42, Зад.3. $\overset{+}{x}\left(\overset{+}{x}-1\right)\left(\overset{+}{x}+5\right)\le 0;\ x_1=0;\ x-1=0;\ x_2=1;\ x+5=0;$

$x_3=-5;$ 

$x\in(-\infty;-5]\cup[0;1]$.

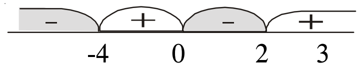
Стр.42, Зад.4. $x^3-10x^2+21x\ge 0;\ \overset{+}{x}\left(x^2-1\overset{+}{0}x+21\right)=0;\ x_1=0;$

$x^2-10x+21=0;\ x_2=3;\ x_3=7;$ 

$x\in[0;3]\cup[7;+\infty)$.

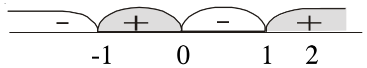
Стр.42, Зад.5. $x^3+2x^2-8x<0;\ x\left(x^2+2x-8\right)=0;\ x_1=0;$

$x^2+2x-8=0;\ x_{2,3}=-1\pm\sqrt{1+8}=-1\pm 3;\ x_2=2;\ x_2=-4;$



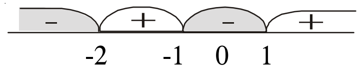
$3^3+2.3^2-8.3>0;\ x\in(-\infty-4)\cup(0;2)$.

Стр.42, Зад.6. $x^3-x\ge 0;\ x\left(x^2-1\right)=0;\ x_1=0;\ x^2-1=0;\ x_2=1;$

$x_3=-1;$ 

$2^3-2>0;\ x\in[-1;0]\cup[1;+\infty)$

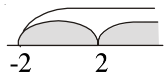
Стр.42, Зад.7. $\left(\overset{-}{x^2}-1\right)\left(\overset{+}{x}+2\right)<0;\ x^2-1=0;\ x^2=1;\ x_{1,2}=\pm 1;$

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

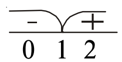
$x\in(-\infty;-2)(-1;1)$.

Стр.42, Зад.8. $\left(x^2-4\right)(x-2)>0;\ (x-2)(x+2)(x-2)>0;$

$(x-2)^2(x+2)>0;\ (x-2)^2>0$ за всяко $x\ne 2$.

Следователно $\left|\begin{array}{l}x+2>0\\ x\ne 2\end{array}\right. \to \left|\begin{array}{l}x>-2\\ x\ne 2\end{array}\right.$ 

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

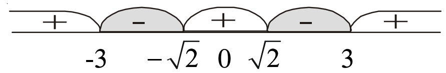
Стр.42, Зад.9. $x^3-1<0;\ x^3-1=0;\ x^3=1;\ x=1$ 

Когато има само един корен, проверяваме знаците на всеки интервал,

като вземем число от него: $f(x)=x^3-1;\ f(0)=-1$ (знак (-) на I интервал); $f(2)=2^3=2^3-1=7$ (знак $(+)$ на II интервал). Знакът на неравенството е (-) (на $<$). Решение е $x\in(-\infty;1)$.

Стр.42, Зад.10. $x^4-11x^2+18<0;\ x^4-11x^2+18=0;\ x^2=t;$

$t^2-11t+18=0;\ t_{1,2}=\dfrac{11\pm\sqrt{121-72}}{2}=\dfrac{11\pm 7}{2};\ t_1=9;\ t_2=2;\ x^2=9\to$

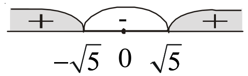
$x_{1,2}=\pm 3;\ x^2=2\to x_{3,4}=\pm\sqrt{2}$ 

$f(0)=0^4-11.0^2+18=18;\ x\in\left(-3;\sqrt{2}\right)\cup\left(\sqrt{2};3\right)$.

Стр.42, Зад.11. $x^4-3x^2-10\ge 0;\ x^4-3x^2 10=0;\ x^2=t;$

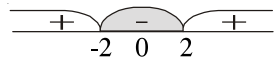
$t^2-3t-10=0;\ t_1=5;\ t_2=-2;\ (t-5)(t+2)=\left(x^2-5\right)\left(x^2+2\right);$

$\left(x^2-5\right)\left(x^2+2\right)\ge 0$. Но $x^2+2>0$ за всяко x. Следователно $x^2-5\ge 0\to x^2=5\to x=\pm\sqrt{5}$



$x\in\left(-\infty;-\sqrt{5}\right]\cup\left[\sqrt{5};+\infty\right)$.

Стр.42, Зад.12. $x^4-3x^2-4<0;\ x^4-3x^2-4=0;\ x^2=t;\ t^2-3t-4=0;$

$t_1=-1;\ t_2=4;\ \left(x^2+1\right)\left(x^2-4\right)<0$. Но $x^2+1>0$ за всяко x и следователно $x^2-4<0;\ x^2-4=0;\ x=\pm 2$ 

$x\in(-2;2)$.

Стр.42, Зад.13. $x^4+3x^2+3>0;\ x^2=t;\ t^2+3t+3=0;\ D<0$.

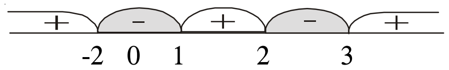
Следователно решението е $x\in(-\infty;+\infty)$.

Стр.42, Зад.14. $x^4+5x^2+6<0;\ x^2=t;\ t^2+5t+6=0;\ t_1=-2;\ t_2=-3$

$\left(x^2+2\right)\left(x^2+3\right)<0$. Но $x^2+2>0$ за всяко x и $x^2+3>0$ за всяко x. Следователно неравенството няма решение.

Стр.42, Зад.15. $\left(\overset{+}{x^2-5x+6}\right)\left(\overset{-}{x^2+x-2}\right)<0$;

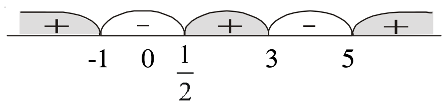
$x^2-5x+6=0 \to x_1=3;\ x_2=2;\ x^2+x-2=0;\ x_3=1;\ x_4=-2$



$x\in(-2;1)\cup(2;3)$.

Стр.42, Зад.16. $\left(x^2-8x+15\right)\left(2x^2+x-1\right)>0$; $x^2-8x+15=0$;

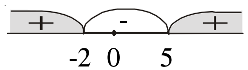
$x_1=3;\ x_2=5;\ 2x^2+x-1=0;\ x_3=-1;\ x_4=\frac{1}{2}$



$x\in(-\infty;-1)\cup\left(\frac{1}{2};3\right)\cup(5;+\infty)$.

Стр.45, Зад.1. $\frac{x-5}{x+2}>0$; $(\overset{-}{x-5})(\overset{+}{x+2})>0$; $x-5=0;\ x=5;\ x+2=0;$

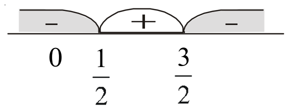
$x=-2$;



$x\in(-\infty;-2)\cup(5;+\infty)$.

Стр.45, Зад.2. $\frac{2x-1}{3-2x}\le 0$; $3-2x\ne 0$; $x\ne\frac{3}{2}$; $\begin{cases}(\overset{-}{2x-1})(\overset{+}{3-2x})\le 0\\ x\ne\frac{3}{2}\end{cases}$

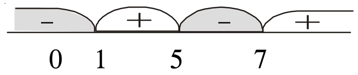
$2x-1=0;\ x=\frac{1}{2};\ 3-2x=0;\ x=\frac{3}{2}$;



$x\in\left(-\infty;\frac{1}{2}\right]\cup\left(\frac{3}{2};+\infty\right)$.

Стр.45, Зад.3. $\frac{(x-1)(x-5)}{x-7}\le 0$; $x-7\ne 0$; $x\ne 7$;

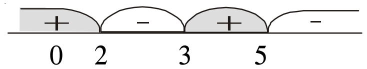
$\begin{cases}(\overset{-}{x-1})(\overset{-}{x-5})(\overset{-}{x-7})\le 0\\ x\ne 7\end{cases}$; $x-1=0;\ x=1;\ x-5=0;\ x=5;\ x-7=0;\ x=7$



$x\in(-\infty;1]\cup[5;7)$.

Стр.45, Зад.4. $\frac{(2-x)(x-3)}{x-5}>0$; $x\ne 5$; $\begin{cases}(\overset{+}{2-x})(\overset{-}{x-3})(\overset{-}{x-5})>0\\ x\ne 5\end{cases}$

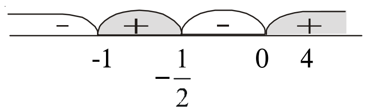
$2-x=0;\ x=2;\ x-3=0;\ x=3;\ x-5=0;\ x=5$;



$x\in(-\infty;2)\cup(3;5)$.

Стр.45, Зад.5. $\frac{2x+1}{(x-4)(x+1)}\ge 0$; $x-4\ne 0$; $x\ne 4$; $x+1\ne 0$; $x\ne -1$;

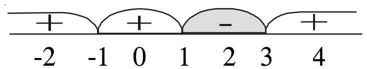
$\begin{cases}(\overset{+}{2x+1})(\overset{-}{x-4})(\overset{+}{x+1})\ge 0\\ x\ne\{4,\ 0,\ -1\}\end{cases}$; $2x+1=0;\ x=-\frac{1}{2};\ x=4;\ x=-1$



$x\in\left(-1;-\frac{1}{2}\right]\cup(4;+\infty)$.

Стр.45, Зад.6. $\frac{(x-3)(x+1)^2}{x-1}<0$; $x\ne 1$; $\begin{cases}(x-3)(x+1)^2(x-1)<0\\ x\ne 1\end{cases}$

$x-3=0;\ x=3;\ x-1=0;\ x=1;\ (x+1)^2>0$ за всяко $x\ne -1$



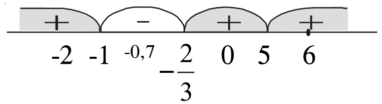
Тъй като има множител на по-висока степен $\left\{(x+1)^2\right\}$, то ще проверим знаците на всеки интервал, като вземем число от него. Избираме $-2, 0, 2, 4$. $f(x)=(x-3)(x+1)^2(x-1)$; $f(-2)=(-)(+)(-)=(+)$;

$f(0)=(-)(+)(-)=(+)$; $f(2)=(-)(+)(+)=(-)$; $f(4)=(+)(+)(+)=(+)$

Решението е $x\in(1;3)$.

Стр.45, Зад.7. $\dfrac{(3x+2)}{(x-5)^2(x+1)}\ge 0;\ \left|\begin{array}{l}(3x+2)(x-5)^2(x+1)\ge 0\\ x\ne\{5;-1\}\end{array}\right.$

$3x+2=0;\ x=-\frac{2}{3};\ x-5=0;\ x=5;\ x+1=0;\ x=-1$

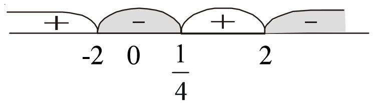


$f(-2)=[3(\overset{-}{-2})+2](-2\overset{+}{-}5)^2(-\overset{-}{2}+1)>0;\ f(0)>0;\ f(6)>0;$

$f(-0,7)<0;\ x\in(-\infty;-1)\cup\left[-\frac{2}{3};5\right)\cup(5;+\infty)$.

Стр.45, Зад.8. $\dfrac{1-4x}{x^2-4}<0;\ \left|\begin{array}{l}(1-4x)(x^2-4)<0\\ x\ne\pm 2\end{array}\right.;\ 1-4x=0;\ x=\frac{1}{4};$

$x^2=4;\ x=\pm 2$



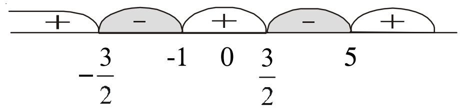
$f(0)=(1-0)(0-4)<0$

Във II интервал нанасяме знак (-), а в съседните правим алтернативна смяна на знаците (-+-+…). Решение са интервалите, в които знаците съвпадат с този на неравенството. $[<\ \to\ (-)]$; $x\in\left(-2;\frac{1}{4}\right)\cup(2;+\infty)$.

Стр.45, Зад.9. $\dfrac{(4x^2-9)(x+1)}{x-5}\le 0;\ \left|\begin{array}{l}(4x^2-9)(x+1)(x-5)\le 0\\ x\ne 5\end{array}\right.$

$4x^2-9=0;\ x^2=\frac{9}{4};\ x=\pm\frac{3}{2};\ x-5=0;\ x=5;\ x+1=0;\ x=-1$

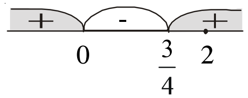
$f(0)=(0-9)(0+1)(0-5)>0$



$x\in\left[-\frac{3}{2};-1\right]\cup\left[\frac{3}{2};5\right]$.

Стр.45, Зад.10. $\dfrac{x-3}{x}\ge -3;\ \dfrac{x-3}{x}+3\ge 0;\ \dfrac{x-3+3x}{x}\ge 0;$

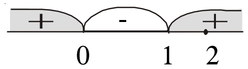
$\dfrac{4x-3}{x}\ge 0\ \to\ \left|\begin{array}{l}(4x-3)x\ge 0\\ x\ne 0\end{array}\right.;\ x_1=0;\ 4x-3=0;\ x_2=\frac{3}{4};$



$f(2)(4.2-3)2>0;\ x\in(-\infty;0)\cup\left[\frac{3}{4};+\infty\right)$.

Стр.45, Зад.11. $\dfrac{x^2}{x-1}>x;\ x\ne 1;\ \dfrac{x^2}{x-1}-x>0;\ \dfrac{x^2-x(x-1)}{x-1}>0;$

$\dfrac{x^2-x^2+x}{x-1}>0;\ \dfrac{x}{x-1}>0;\ x(x-1)>0;\ x_1=0;\ x_2=1$

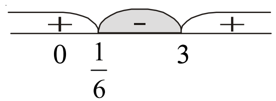


$f(2)=2(2-1)>0;\ x\in(-\infty;0)\cup(1;+\infty)$.

Стр.45, Зад.12. $\dfrac{2x^2-1}{x-3}<2x;\ x\ne 3;\ \dfrac{2x^2-1-2x(x-3)}{x-3}<0$

$\dfrac{2x^2-1-2x^2+6x}{x-3}<0;\ \dfrac{6x-1}{x-3}<0;\ (6\overset{-}{x}-1)(\overset{-}{x}-3)<0;\ x_1=\frac{1}{6};\ x_2=3;$

$f(0)=(-1)(-3)>0$

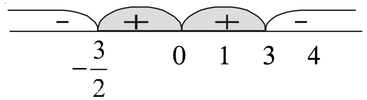


Решение е $x\in\left(\frac{1}{6};3\right)$.

Стр.45, Зад.13. $\frac{x+1}{x^2}>\frac{1}{x-3}$; $x\neq 0$; $x\neq 3$; $\frac{x+1}{x^2}-\frac{1}{x-3}>0$;

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

$x^2(-2x-3)(x-3)>0$; $x_1=0$; $x_2=-\frac{3}{2}$; $x_3=3$;



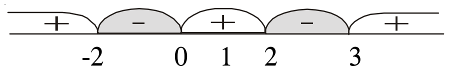
$f(1)=1^2(-2-3)(1-3)>0$;

$f(4)<0$; $f(-1)>0$; $f(-2)<0$; $x\in\left(-\frac{3}{2};0\right)\cup(0;3)$.

Стр.45, Зад.14. $\frac{x}{x+2}+\frac{2}{x^2-4}<\frac{1}{x-2}$; $x\neq\pm 2$; $\frac{x}{x+2}+\frac{2}{x^2-4}-\frac{1}{x-2}<0$

$\frac{x(x-2)+2-(x+2)}{(x+2)(x-2)}<0$; $\frac{x^2-2x+2-x-2}{(x-2)(x+2)}<0$; $\frac{(x^2-3x)}{(x-2)(x+2)}<0$;

$x(x-3)(x-2)(x+2)<0$; $x_1=0$; $x_2=3$; $x_3=2$; $x_4=-2$



$f(1)=1(1-3)(1-2)(1+2)>0$

$x\in(-2;0)\cup(2;3)$.

Стр.45, Зад.15.

$\frac{2-x}{x+1}+\frac{x+2}{x-1}<\frac{7x-x^3}{x^2-1}$; $x\neq\pm 1$; $\frac{2-x}{x+1}+\frac{x+2}{x-1}-\frac{7x-x^3}{x^2-1}<0$;

$\frac{(2-x)(x-1)+(x+2)(x+1)-(7x-x^3)}{x^2-1}<0$;

$\frac{2x-x^2-2+x+x^2+2x+x+2-7x+x^3}{x^2-1}<0$; $\frac{-x+x^3}{x^2-1}<0$; $(-x+x^3)(x^2-1)<0$;

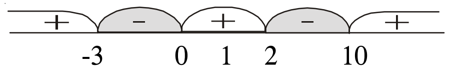
$-x(1-x^2)(x^2-1)<0$; $x(x^2-1)^2<0 \to \left|\begin{matrix}x<0\\ x\neq\pm 1\end{matrix}\right. \to x\in(-\infty;-1)\cup(-1;0)$.

Стр.45, Зад.16.

$\frac{x}{x-2}-\frac{13}{x+3}\le\frac{26}{(x-2)(x+3)}$; $\frac{x}{x-2}-\frac{13}{x+3}-\frac{26}{(x-2)(x+3)}\le 0$;

$\frac{x(x+3)-13(x-2)-26}{(x-2)(x+3)}\le 0$; $\frac{x^2+3x-13x+26-26}{(x-2)(x+3)}\le 0$; $\frac{x^2-10x}{(x-2)(x+3)}\le 0$

$x(x-10)(x-2)(x+3)\le 0$; $x_1=0$; $x_2=10$; $x_3=2$; $x_4=-3$



$f(-1)=\overset{+}{1}(1\overset{-}{-}10)(1\overset{-}{-}2)(1\overset{+}{+}3)>0$; $x\in(-3;0]\cup(2;10]$.

Стр.48, Зад.1. $\left(\sqrt{2x-1}\right)^2=(x-2)^2$; $2x-1=x^2-4x+4$;

$x^2-6x+5=0$; $D=9-5=4$; $x_1=3+2=5$; $x_2=3-2=1$. Проверка:

За $x=5\to\sqrt{10-1}=5-2$; $3=3\Rightarrow x-5$ е решение.

За $x=1\to\sqrt{2-1}=1-2$; $1\neq-1\Rightarrow x=1$ не е решение.

Стр.48, Зад.2. $\left(\sqrt{x+10}\right)^2=(x+4)^2$; $x+10=x^2+8x+16$;

$x^2+7x+6=0$; $D=49-24=25$; $x_1=\frac{-7+5}{2}=-1$; $x_2=\frac{-7-5}{2}=-6$.

Проверка: За $x=-1\to\sqrt{-1+10}=-1+4$; $3=3\Rightarrow x=-1$ е решение.

За $x=-6\to\sqrt{-6+10}=-6+4$; $2\neq-2\Rightarrow x=-6$ не е решение.

Стр.48, Зад.3. $\left(\sqrt{x^2-24}\right)^2=\left(\sqrt{-x^2+6x-24}\right)^2$; $x^2-24=-x^2+6x-24$;

$2x^2-6x=0$; $2x(x-3)=0$; $x_1=0$; $x_2=3$. Проверка: