7.7

1) $(2x)\,3x-(2x)\frac{1}{2}-(2x)\frac{1}{x}=0(2x)$

$LCD: 2x$

$\frac{2x}{2}\neq\frac{0}{2}$

$*\,x\neq 0\,*$

$6x^2-x-2=0$

$(2x+1)(3x-2)=0$

$2x+1=0 \quad 3x-2=0$

$\underline{-1\ \ -1} \qquad \underline{+2\ \ +2}$

$\frac{2x}{2}=\frac{-1}{2} \qquad \frac{3x}{3}=\frac{2}{3}$

$x=-\frac{1}{2} \qquad x=\frac{2}{3}$

3) $x(x-4)+\frac{20}{(x-4)}\,(x-4)=\frac{5x}{(x-4)}\,(x-4)-2\,(x-4)$

$LCD: (x-4)$

$x-4\neq 0$

$\underline{+4\ \ +4}$

$*\,x\neq 4\,*$

$x^2-4x+20=5x-2x+8$

$x^2-4x+20=3x+8$

$\underline{-3x-8\ \ -3x-8}$

$x^2-7x+12=0$

$(x-4)(x-3)=0$

$x-4=0 \quad x-3=0$

$\underline{+4\ \ +4} \qquad \underline{+3\ \ +3}$

~~$x=4$~~ $\qquad x=3$

5) $x(x-3)+\frac{6}{(x-3)}(x-3)=\frac{2x}{(x-3)}\,(x-3)$

$LCD=x-3$

$x-3\neq 0$

$\underline{+3\ \ +3}$

$*\,x\neq 3\,*$

$x^2-3x+6=2x$

$\underline{-2x\qquad -2x}$

$x^2-5x+6=0$

$(x-2)(x-3)=0$

$x-2=0 \quad x-3=0$

$\underline{+2\ \ +2} \qquad \underline{+3\ \ +3}$

$x=2 \qquad$ ~~$x=3$~~

7) $\frac{2x}{3x-4}(6x-1)(3x-4)=\frac{4x+5}{6x-1}(6x-1)(3x-4)-\frac{3}{3x-4}(6x-1)(3x-4)$

$LCD:(6x-1)(3x-4)$

$6x-1\neq 0 \quad 3x-4\neq 0$

$+1 \quad +1 \qquad +4 \quad +4$

$\frac{6x}{6}\neq\frac{1}{6} \qquad \frac{3x}{3}\neq\frac{4}{3}$

$*x\neq\frac{1}{6}** x\neq\frac{4}{3}*$

$12x^2-2x=12x^2-16x+15x-20-18x+3$

$12x^2-2x=12x^2-19x-17$

$-12x^2 \qquad -12x^2$

$-2x=-19x-17$

$+19x \quad +19x$

$\frac{17x}{17}=-\frac{17}{17}$

$x=-1$

9) $\frac{3m}{2m-5}(2)(2m-5)(3m+1)-\frac{7}{3m+1}(2)(2m-5)(3m+1)=\frac{3}{2}(2)(2m-5)(3m+1)$

$LCD:(2)(2m-5)(3m+1)$

$2m-5\neq 0 \quad 3m+1\neq 0$

$+5 \quad +5 \qquad -1 \quad -1$

$\frac{2m}{2}\neq\frac{5}{2} \qquad \frac{3m}{3}\neq-\frac{1}{3}$

$*x\neq\frac{5}{2}** x\neq-\frac{1}{3}*$

$18m^2+6m-28m+70=18m^2-39m-15$

$18m^2-22m+70=18m^2-39m-15$

$-18m^2 \qquad -18m^2$

$-22m+70=-39m-15$

$+39m \qquad +39m$

$17m+70=-15$

$-70 \quad -70$

$\frac{17m}{17}=\frac{-85}{17}$

$m=-5$

11) $\frac{4-x}{1-x}(1-x)(3-x)=\frac{12}{3-x}(1-x)(3-x)$

$LCD:(1-x)(3-x)$

$1-x\neq 0 \quad 3-x\neq 0$

$+x \quad +x \qquad +x \quad +x$

$*1\neq x** 3\neq x*$

$12-4x-3x+x^2=12-12x$

$x^2-7x+12=12-12x$

$+12x-12 \quad -12+12x$

$x^2+5x=0$

$x(x+5)=0$

$x = 0 \quad x + 5 = 0$

$\underline{\quad -5 \quad -5}$

$x = -5$

13) $\frac{7}{y-3}(2)(y-3)(y-4) - \frac{1}{2}(2)(y-3)(y-4) = \frac{y-2}{y-4}(2)(y-3)(y-4)$

$LCD: (2)(y-3)(y-4)$

$y - 3 \neq 0 \quad y - 4 \neq 0$

$\underline{+3 \quad +3 \quad +4 \quad +4}$

$*y \neq 3 * * y \neq 4 *$

$14y - 56 - y^2 + 3y + 4y - 12 = 2y^2 - 6y - 4y + 12$

$-y^2 + 21y - 68 = 2y^2 - 10y + 12$

$\underline{+y^2 - 21y + 68 \quad +y^2 - 21y + 68}$

$0 = 3y^2 - 31y + 80$

$0 = (3y - 16)(y - 5)$

$3y - 16 = 0 \quad y - 5 = 0$

$\underline{+16 \ +16 \quad +5 \quad +5}$

$\frac{3y}{3} = \frac{16}{3} \quad y = 5$

15) $\frac{1}{x+2}(x+2)(x-2) + \underset{x-2}{\frac{1}{2-x}}(x+2)(x-2) = \underset{(x-2)(x+2)}{\frac{3x+8}{x^2-4}}(x+2)(x-2)$

$LCD: (x+2)(x-2)$

$x + 2 \neq 0 \quad x - 2 \neq 0$

$\underline{-2 \quad -2 \quad +2 \quad +2}$

$x \neq -2 \quad x \neq 2$

$x - 2 + x + 2 = 3x + 8$

$2x = 3x + 8$

$\underline{-3x \quad -3x}$

$-\frac{x}{-1} = \frac{8}{-1}$

$x = -8$

17) $\frac{(x+1)}{x-1}(6)(x-1)(x+1) + \frac{-x+1}{x+1}(6)(x-1)(x+1) = \frac{5}{6}(6)(x-1)(x+1)$

$LCD: (6)(x-1)(x+1)$

$x - 1 \neq 0 \quad x + 1 \neq 0$

$\underline{+1 \quad +1 \quad -1 \quad -1}$

$* x \neq 1 * * x \neq -1 *$

$6x^2 + 6x + 6x + 6 - 6x^2 + 6x + 6x - 6 = 5x^2 - 5$

$24x = 5x^2 - 5$

$\underline{-24x \quad -24x}$

$0 = 5x^2 - 24x - 5$

$0 = (5x + 1)(x - 5)$

$$5x+1=0 \quad x-5=0$$
$$\underline{\quad -1 \ -1 \quad} \quad \underline{\quad +5 \ \ +5 \quad}$$
$$\frac{5x}{5}=\frac{-1}{5} \qquad x=5$$
$$x=-\frac{1}{5}$$

19) $\frac{3}{2x+1}\frac{(2x+1)(2x-1)}{1}+\frac{-2x-1}{2x-1}\frac{(2x+1)(2x-1)}{1}=1\frac{(2x+1)(2x-1)}{1}-\frac{8x^2}{4x^2-1}\frac{(2x+1)(2x-1)}{1}$

$LCD:\ (2x+1)(2x-1)$

$$2x+1\neq 0 \quad 2x-1\neq 0$$
$$\underline{\quad -1 \ \ -1 \quad} \quad \underline{\quad +1 \ \ +1 \quad}$$
$$\frac{2x}{2}\neq\frac{-1}{2} \qquad \frac{2x}{2}\neq\frac{1}{2}$$
$$*\,x\neq -\frac{1}{2}* \quad *\,x\neq\frac{1}{2}\,*$$

$$6x-3-4x^2-2x-2x-1=4x^2-1-8x^2$$
$$-4x^2+2x-4=-4x^2-1$$
$$\underline{+4x^2 \qquad\qquad +4x^2}$$
$$2x-4=-1$$
$$\underline{\quad +4 \quad +4 \quad}$$
$$\frac{2x}{2}=\frac{3}{2}$$
$$x=\frac{3}{2}$$

21) $\frac{x-2}{x+3}(x+3)(x-2)-\frac{1}{x-2}(x+3)(x-2)=\frac{1}{x^2+x-6}(x+3)(x-2)$

$(x-2)(x+3)$

$LCD:\ (x+3)(x-2)$

$$x+3\neq 0 \quad x-2\neq 0$$
$$\underline{\quad -3 \quad -3 \quad} \quad \underline{\quad +2 \quad +2 \quad}$$
$$*\,x\neq -3 * *\,x\neq 2\,*$$

$$x^2-4x+4-x-3=1$$
$$x^2-5x+1=1$$
$$\underline{\quad -1 \ \ -1 \quad}$$
$$x^2-5x=0$$
$$x(x-5)=0$$
$$x=0 \quad x-5=0$$
$$\underline{\quad +5 \quad +5 \quad}$$
$$x=5$$

~~$5(x+4)$~~

23) $\frac{3}{x+2}+\frac{x-1}{x+5}=\frac{5x+20}{6x+24}$

$\overset{6(x+4)}{}$

$\frac{3}{x+2}(6)(x+2)(x+5)+\frac{x-1}{x+5}(6)(x+2)(x+5)=\frac{5}{6}(6)(x+2)(x+5)$

$LCD:\ (6)(x+2)(x+5)$

$x+2\neq 0 \quad x+5\neq 0$

$\underline{\quad -2 \quad -2 \quad} \ \underline{\quad -5 \quad -5 \quad}$

$*x\neq -2 * * x\neq -5 *$

$18x+90+6x^2+12x-6x-12=5x^2+25x+10x+50$

$6x^2+24x+78=5x^2+35x+50$

$\underline{-5x^2-35x-50 \ -5x^2-35x-50}$

$x^2-11x+28=0$

$(x-7)(x-4)=0$

$x-7=0 \quad x-4=0$

$\underline{\quad +7 \quad +7 \quad} \ \underline{\quad +4 \quad +4 \quad}$

$x=7 \qquad x=4$

25) $\frac{x}{x-1}(x+1)(x-1)-\frac{2}{x+1}(x+1)(x-1)=\frac{4x^2}{x^2-1}(x+1)(x-1)$

$(x+1)(x-1)$

$LCD:\ (x+1)(x-1)$

$x+1\ \neq 0 \quad x-1\neq 0$

$\underline{\quad -1 \quad -1 \quad +1 \ +1 \quad}$

$*x\neq -1 * \quad * x\neq 1*$

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

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

$\underline{-x^2+x-2 \ \ -x^2+x-2}$

$0=3x^2+x-x$

$0=(3x-2)(x+1)$

$3x-2=0 \quad x+1=0$

$\underline{\quad +2 \ +2 \quad} \ \underline{\quad -1 \ -1 \quad}$

$\frac{3x}{3}=\frac{2}{3} \qquad x=-1$

$x=\frac{2}{3}$

27) $\frac{2x}{x+1}(x+1)(x+5) - \frac{3}{x+5}(x+1)(x+5) = \frac{-8x^2}{x^2+6x+5}(x+1)(x+5)$
$(x+1)(x+5)$

$LCD: (x+1)(x+5)$

$x+1 \neq 0 \quad x+5 \neq 0$

$-1 \ -1 \quad -5 \ -5$

$*x \neq -1 * * x \neq -5 *$

$2x^2 + 10x - 3x - 3 = -8x^2$

$2x^2 + 7x - 3 = -8x^2$

$+8x^2 \qquad +8x^2$

$10x^2 + 7x - 3 = 0$

$(10x-3)(x+1) = 0$

$10x - 3 = 0 \quad x + 1 = 0$

$+3 \ +3 \quad -1 \ -1$

$\frac{10x}{10} = \frac{3}{10} \quad x = -1$

$x = \frac{3}{10}$

29) $\frac{x-5}{x-9}(x-9)(x-3) + \frac{x+3}{x-3}(x-9)(x-3) = \frac{-4x^2}{x^2-12x+27}(x-9)(x-3)$
$(x-9)(x-3)$

$LCD: (x-9)(x-3)$

$x - 9 \neq 0 \quad x - 3 \neq 0$

$+9 \ +9 \quad +3 \ +3$

$*x \neq 9 * * x \neq 3 *$

$x^2 - 3x - 5x + 15 + x^2 - 9x + 3x - 27 = -4x^2$

$2x^2 - 14x - 12 = -4x^2$

$+4x^2 \qquad +4x^2$

$6x^2 - 14x - 12 = 0$

$2(3x^2 - 7x - 6) = 0$

$2(3x+2)(x-3) = 0$

$3x + 2 = 0 \quad x - 3 = 0$

$-2 \ -2 \quad +3 \ +3$

$\frac{3x}{3} = \frac{-2}{3} \quad x = 3$

$x = -\frac{2}{3}$

31) $\frac{x-3}{x-6}(x-6)(x+3)+\frac{x+5}{x+3}(x-6)(x+3)=\frac{-2x^2}{x^2-3x-18}(x-6)(x+3)$
$(x-6)(x+3)$

$LCD:\ (x-6)(x+3)$

$x-6\neq 0 \quad x+3\neq 0$

$+6\ \ +6 \qquad -3\ \ -3$

$*x\neq 6* \quad *x\neq -3*$

$x^2-9+x^2-6x+5x-30=-2x^2$

$2x^2-x-90=-2x^2$

$+2x^2 \qquad +2x^2$

$4x^2-x-90=0$

$(4x-13)(x+3)=0$

$4x-13=0 \quad x+3=0$

$+13\ \ +13 \qquad -3\ \ -3$

$\frac{4x}{4}=\frac{13}{4} \qquad x=-3$

$x=\frac{13}{4}$

33) $\frac{4x+1}{x+3}(x+3)(x-1)+\frac{5x-3}{x-1}(x+3)(x-1)=\frac{8x^2}{x^2+2x-3}(x+3)(x-1)$
$(x+3)(x-1)$

$LCD:\ (x+3)(x-1)$

$x+3\neq 0 \quad x-1\neq 0$

$-3\ \ -3 \qquad +1\ \ +1$

$*x\neq -3** x\neq 1*$

$4x^2-4x+x-1+5x^2+15x-3x-9=8x^2$

$9x^2+9x-10=8x^2$

$-8x^2 \qquad -8x^2$

$x^2+9x-10=0$

$(x+10)(x-1)=0$

$x+10=0 \quad x-1=0$

$-10\ \ -10 \qquad +1\ \ +1$

$x=-10 \qquad \cancel{x=1}$