Solving Rational Equations Loss #1, page 1 of 2

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

$5 = 1 + x - 6$

$5 = x - 5$

$\boxed{x = 10}$

② $\frac{1}{x} + \frac{1}{x^2+x} = \frac{5}{x^2+x}$ $(x+1)$ / $(x+1)x$ / $x(x+1)$

$x + 1 + 1 = 5$

$x + 2 = 5$

$\boxed{x = 3}$

③ $\frac{3}{1} = \frac{5k+15}{3k+6} - \frac{k+4}{3k+6}$ $(3)(k+2)$ / $(3)(k+2)$ / $3(k+2)$ / $3(k+2)$

$9k + 18 = 5k + 15 - k - 4$

$9k + 18 = 4k + 11$

$5k = -7$

$\boxed{k = -\frac{7}{5}}$

④ $\frac{1}{r^2+2r-3} + \frac{6r+6}{r^2+2r-3} = \frac{1}{(r-1)}$ $(r+3)$ / $(r-1)(r+3)$ / $(r-1)(r+3)$

$1 + 6r + 6 = r + 3$

$6r + 7 = r + 3$

$5r = -4$

$\boxed{r = -\frac{4}{5}}$

⑤ $\frac{1}{n} - \frac{6}{n^2+3n} = \frac{4}{(n+3)(n)}$ $(n+3)$ / $(n+3)$ / $n(n+3)$

$n + 3 - 6 = 4n$

$n - 3 = 4n$

$-3 = 3n$

$\boxed{n = -1}$

⑥ $\frac{(p-5)}{(p+1)}^3 = \frac{2p+10}{3p-3} - \frac{1}{3p-3}$ / 3 / $3(p-1)$ / $3(p-1)$

$3p - 15 = 2p + 10 - 1$

$3p - 15 = 2p + 9$

$\boxed{p = 24}$

⑦ $\frac{n-4}{3n^2-5n} = \frac{n-1}{3n^2-5n} - \frac{1}{n}$ $(3n-5)$ / $n(3n-5)$ / $n(3n-5)$

$n - 4 = n - 1 - 3n + 5$

$n - 4 = -2n + 4$

$3n = 8$

$\boxed{n = \frac{8}{3}}$

⑧ $\frac{1}{r+1} = \frac{4}{1} + \frac{4}{r+1}$ $(r+1)$ / $(r+1)$

$1 = 4r + 4 + 4$

$1 = 4r + 8$

$-7 = 4r$

$\boxed{r = -\frac{7}{4}}$

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⑨ $\frac{3}{p^2-3p-4} = \frac{3p^2+14p-24}{(p+1)(p-4)} + \frac{(p+4)(p+1)}{(p+1)(p-4)}$

$3 = 3p^2+14p-24+p^2+5p+4$

$3 = 4p^2+19p-20$

$4p^2+19p-23=0$

$(4p+23)(p-1)=0$

$4p+23=0 \quad p-1=0$

$4p=-23 \quad p=1$

$p=-\frac{23}{4}$

⑩ $\frac{6}{3(r-3)}^3 - \frac{r^2-5r-6}{3r-9} = \frac{(r+3)(r-3)}{3(r-3)}$

$3(r-3)$

$18 - r^2+5r+6 = r^2-9$

$-r^2+5r+24 = r^2-9$

$0 = 2r^2-5r-33$

$(2r-11)(r+3)=0$

$2r-11=0 \quad r+3=0$

$2r=11$

$r=\frac{11}{2}, \; r=-3$

⑪ $\frac{1}{x}^{(x-1)} + \frac{1}{(x-1)}^{(x)} = \frac{(x+2)}{(x)(x-1)}^{x}$

$x-1+x^2-x = x^2+2x$

$x^2-1 = x^2+2x$

$-1 = 2x$

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

⑫ $\frac{k+4}{k(k-5)} + \frac{k(k-6)}{k(k-5)} = \frac{k-1}{k(k-5)}$

$k+4+k^2-6k = k-1$

$k^2-5k+4 = k-1 \quad k-1=0 \quad k-5=0$

$k^2-6k+5=0 \quad k=1 \quad k=5$ extraneous

$(k-1)(k-5)=0$

⑬ $\frac{(p-6)}{(p-4)p}^{(p-4)} = \frac{2}{(p-4)}^{(p)} - \frac{(p+6)(p-4)}{p(p-4)}$

$p^2-10p+24 = 2p-p^2-2p+24$

$p^2-10p+24 = -p^2+24$

$2p^2-10p=0$

$2p(p-5)=0$

$2p=0 \quad p=0$ extraneous

$p-5=0 \quad p=5$

⑭ $\frac{r}{(r+3)}^{(r-6)} = \frac{3}{(r+3)}^{(r-6)} + \frac{4}{r^2-3r-18}$

$(r+3)(r-6)$

$r^2-6r = 3r-18+4$

$r^2-6r = 3r-14$

$r^2-9r+14=0$

$(r-2)(r-7)=0$

$r-2=0, \; r-7=0$

$r=2, \; r=7$

⑮ $\frac{n^2+n-6}{n-3} = \frac{1}{1}^{(n-3)} + \frac{2n-4}{n-3}$

$n^2+n-6 = n-3+2n-4$

$n^2+n-6 = 3n-7$

$n^2-2n+1=0 \quad n-1=0$

$(n-1)(n-1)=0 \quad n=1$

⑯ $\frac{1}{x^2} = \frac{1}{1}^{(x^2)} \frac{(x-4)}{(x)}^{x}$

$1 = x^2-x^2+4x$

$4x=1$

$x=\frac{1}{4}$