SIMULAZIONE 2 (sulle frazioni algebriche) – CORREZIONE

1) $$\left(\frac{2}{a+b}+\frac{2}{a-b}-\frac{3a}{a^2-b^2}\right)\left(a-\frac{b^2}{a}\right)=\left[\frac{2}{a+b}+\frac{2}{a-b}-\frac{3a}{(a+b)(a-b)}\right]\cdot\frac{a^2-b^2}{a}=$$
$$=\frac{2(a-b)+2(a+b)-3a}{\cancel{(a+b)(a-b)}}\cdot\frac{\cancel{(a+b)(a-b)}}{a}=\frac{2a\cancel{-2b}+2a\cancel{+2b}-3a}{a}=\frac{\cancel{a}}{\cancel{a}}=1$$

2) $$\frac{\frac{b+3}{b-3}-\frac{b-3}{b+3}}{1-\frac{b-3}{b+3}}-2\cdot\frac{b}{b-3}=\frac{\frac{(b+3)^2-(b-3)^2}{(b-3)(b+3)}}{\frac{b+3-b+3}{b+3}}-\frac{2b}{b-3}=\frac{\frac{\cancel{b^2}+6b\cancel{+9}\cancel{-b^2}+6b\cancel{-9}}{(b-3)(b+3)}}{\frac{\cancel{b}+3\cancel{-b}+3}{b+3}}-\frac{2b}{b-3}=$$
$$=\frac{\frac{12b}{(b-3)(b+3)}}{\frac{6}{b+3}}-\frac{2b}{b-3}=\frac{\overset{2}{\cancel{12}}b}{(b-3)\cancel{(b+3)}}\cdot\frac{\cancel{b+3}}{\cancel{6}}-\frac{2b}{b-3}=\frac{2b}{b-3}-\frac{2b}{b-3}=0$$

3) $$\frac{a\left(\frac{a+1}{a^2-a}+\frac{a-1}{a^2+a}\right)}{2}=\frac{a\left[\frac{a+1}{a(a-1)}+\frac{a-1}{a(a+1)}\right]}{2}=\frac{\cancel{a}\cdot\frac{(a+1)^2+(a-1)^2}{\cancel{a}(a-1)(a+1)}}{2}=$$
$$=\frac{a^2\cancel{+2a}+1+a^2\cancel{-2a}+1}{(a-1)(a+1)}\cdot\frac{1}{2}=\frac{2a^2+2}{(a-1)(a+1)}\cdot\frac{1}{2}=\frac{\cancel{2}(a^2+1)}{(a-1)(a+1)}\cdot\frac{1}{\cancel{2}}=\frac{a^2+1}{a^2-1}$$

4) $$a^2+a-2=(a+2)(a-1)$$
$$\left(\frac{1}{a^2+a-2}-\frac{1}{2a^2-a-1}\right)\cdot(2a^2+5a+2)=$$
$$2a^2-a-1=2a^2-2a+a-1=2a(a-1)+(a-1)=(a-1)(2a+1)$$
$$2a^2+5a+2=2a^2+4a+a+2=2a(a+2)+(a+2)=(a+2)(2a+1)$$
$$=\left[\frac{1}{(a+2)(a-1)}-\frac{1}{(a-1)(2a+1)}\right]\cdot(a+2)(2a+1)=\frac{2a+1-a-2}{\cancel{(a+2)}(a-1)\cancel{(2a+1)}}\cancel{(a+2)}\cancel{(2a+1)}=\frac{\cancel{a-1}}{\cancel{a-1}}=1$$

5) $$\left(\frac{1}{x^2+4x-12}-\frac{1}{x^2+12x+36}\right)\cdot\frac{x^2-36}{16}\cdot(2x-4)=\left[\frac{1}{(x+6)(x-2)}-\frac{1}{(x+6)^2}\right]\cdot\frac{(x+6)(x-6)}{\underset{8}{\cancel{16}}}\cdot\cancel{2}(x-2)=$$
$$=\frac{\cancel{x}+6\cancel{-x}+2}{(x+6)^2(x-2)}\cdot\frac{(x+6)(x-6)}{8}\cdot(x-2)=\frac{\cancel{8}}{(x+6)^{\cancel{2}}\cancel{(x-2)}}\cdot\frac{\cancel{(x+6)}(x-6)}{\cancel{8}}\cdot\cancel{(x-2)}=\frac{x-6}{x+6}$$

6) $$\left[\frac{2x-5}{x^3-2x^2-x+2}-\frac{x-1}{(1+x)(2-x)}\right]\cdot\frac{(1-x)^2}{x+2}=\left[\frac{2x-5}{x^2(x-2)-(x-2)}+\frac{x-1}{(x+1)(x-2)}\right]\cdot\frac{(x-1)^2}{x+2}=$$
$$=\left[\frac{2x-5}{(x-2)(x^2-1)}+\frac{x-1}{(x+1)(x-2)}\right]\cdot\frac{(x-1)^2}{x+2}=\left[\frac{2x-5}{(x-2)(x+1)(x-1)}+\frac{x-1}{(x+1)(x-2)}\right]\cdot\frac{(x-1)^2}{x+2}=$$
$$=\frac{\cancel{2x}-5+x^2\cancel{-2x}+1}{(x-2)(x+1)\cancel{(x-1)}}\cdot\frac{(x-1)^{\cancel{2}}}{x+2}=\frac{x^2-4}{(x-2)(x+1)}\cdot\frac{x-1}{x+2}=\frac{\cancel{(x+2)}\cancel{(x-2)}}{\cancel{(x-2)}(x+1)}\cdot\frac{x-1}{\cancel{x+2}}=\frac{x-1}{x+1}$$

7) $$\frac{x^3+2x^2-1}{xy^2+x^2+y^2-1}=\frac{(x+1)(x^2+x-1)\ \ \textit{(Ruffini)}}{y^2(x+1)+(x+1)(x-1)}=\frac{\cancel{(x+1)}(x^2+x-1)}{\cancel{(x+1)}(y^2+x-1)}=\frac{x^2+x-1}{y^2+x-1}$$