

## FRAZIONI ALGEBRICHE - 2

Calcolare le seguenti somme di frazioni algebriche<sup>(1)</sup>.

- |  |   |
|--|---|
| <p><b>84.</b> <math>\frac{4x-23y}{4} - \frac{4x-25y}{6} + \frac{19y-3x}{12};</math></p>                | <p><math>\frac{3a-2b}{3} - \frac{4b+2a}{5} - \frac{9a-22b}{15};</math> <span style="float: right;"><math>\left[\frac{x}{12}; 0\right]</math></span></p>   |
| <p><b>85.</b> <math>\frac{a+b}{2} + \frac{a-b}{3};</math></p>  | <p><math>\frac{3a}{2b} - \frac{5a}{2b} + \frac{7a}{2b} - \frac{a}{2b};</math> <span style="float: right;"><math>\left[\frac{5a+b}{6}; \frac{2a}{b}\right]</math></span></p>                     |
| <p><b>86.</b> <math>\frac{3x-2y}{3} - \frac{4y+2x}{5} + \frac{23y-9x}{15} - \frac{4}{15};</math></p>   | <p><math>\frac{4a+b}{12} - \frac{a-b}{2} - \frac{a+b}{3} + \frac{2a-b}{4};</math> <span style="float: right;"><math>\left[\frac{y-4}{15}; 0\right]</math></span></p>                            |
| <p><b>87.</b> <math>\frac{3x-1}{4} + \frac{2x-3}{6} - \frac{x-4}{12};</math></p>                       | <p><math>\frac{2x-1}{3} + \frac{2-3x}{4} - \frac{26-x}{12};</math> <span style="float: right;"><math>\left[\frac{12x-5}{12}; -2\right]</math></span></p>  |
| <p><b>88.</b> <math>\frac{2a-b}{15} + \frac{3b-c}{20} + \frac{a+b-c}{30};</math></p>                   | <p><math>b + \frac{a-b}{2} + a - \frac{a-b}{2};</math> <span style="float: right;"><math>\left[\frac{10a+7b-5c}{60}; a+b\right]</math></span></p>   |
| <p><b>89.</b> <math>2 - \frac{6a}{3a+2b};</math></p>   | <p><math>\frac{a+b}{a} + \frac{a-b}{a};</math> <span style="float: right;"><math>\left[\frac{4b}{3a+2b}; 2\right]</math></span></p>   |
| <p><b>90.</b> <math>\frac{8a^3}{2a+3b^2} + \frac{27b^6}{3b^2+2a};</math></p>                           | <p><math>\frac{16a^2}{4a+5b} + \frac{5b(8a+5b)}{4a+5b};</math> <span style="float: right;"><math>[4a^2 - 6ab^2 + 9b^4; 4a+5b]</math></span></p>   |
| <p><b>91.</b> <math>\frac{x+y}{x} - \frac{x+y}{y};</math></p>  | <p><math>\frac{x-y}{x} - \frac{x+y}{x};</math> <span style="float: right;"><math>\left[\frac{y^2-x^2}{xy}; \frac{-2y}{x}\right]</math></span></p>   |
| <p><b>92.</b> <math>\frac{1}{a} + \frac{a+1}{a^2} - \frac{2a^2+1}{a^3};</math></p>                     | <p><math>\frac{1}{xy} + \frac{2}{x};</math> <span style="float: right;"><math>\left[\frac{a-1}{a^3}; \frac{1+2y}{xy}\right]</math></span></p>   |
| <p><b>93.</b> <math>\frac{1}{x} + \frac{1}{y} + \frac{1}{z};</math></p>                                | <p><math>\frac{x}{ab} - \frac{y}{ac} - \frac{z}{bc};</math> <span style="float: right;"><math>\left[\frac{xy+xz+yz}{xyz}; \frac{xc-yb-az}{abc}\right]</math></span></p>                         |
| <p><b>94.</b> <math>\frac{x^2+xy+y^2}{x+y} - \frac{x^2-xy+y^2}{x-y} - \frac{2y^3}{y^2-x^2};</math></p> | <p><math>\frac{a-1}{2(a+1)} + \frac{a+1}{2(a-1)} - \frac{a^2+1}{a^2-1};</math> <span style="float: right;"><math>[0; 0]</math></span></p>   |
| <p><b>95.</b> <math>\frac{a+2}{a-1} + \frac{a+3}{a+1} + \frac{5-a^2}{a^2-1};</math></p>                | <p><math>\frac{1}{a-2} + \frac{2}{(a-2)^2} + \frac{1}{(a-2)^3};</math> <span style="float: right;"><math>\left[\frac{a+4}{a-1}; \frac{(a-1)^2}{(a-2)^3}\right]</math></span></p>                |
| <p><b>96.</b> <math>\frac{b^3+1}{b^4-1} - \frac{b+1}{1-b^2} + \frac{b-1}{b^2+1};</math></p>            | <p><math>\frac{y-1}{y^2-2y} - \frac{y+1}{y^2+2y} + \frac{3}{y^2-4};</math> <span style="float: right;"><math>\left[\frac{3(b^2-b+1)}{(b-1)(b^2+1)}; \frac{5}{y^2-4}\right]</math></span></p>    |
| <p><b>97.</b> <math>\frac{x-2}{(x-1)^2+5-3x} - \frac{1}{x-2} - \frac{1}{x-3};</math></p>               | <p><math>\frac{2}{x-2} + \frac{x+1}{x-1} + \frac{2}{x^2-3x+2};</math> <span style="float: right;"><math>\left[\frac{1}{2-x}; \frac{x+2}{x-2}\right]</math></span></p>                           |
| <p><b>98.</b> <math>\frac{x-y}{y} + \frac{2x}{x-y} - \frac{x^3+x^2y}{x^2y-y^3};</math></p>             | <p><math>\frac{5x}{6y} - \frac{10x^2-17xy}{12xy-6y^2} - \frac{y}{y-2x};</math> <span style="float: right;"><math>\left[\frac{y}{x-y}; \frac{2x+y}{2x-y}\right]</math></span></p>                |
| <p><b>99.</b> <math>\frac{1}{a^4+a^2b^2} - \frac{1}{2a^3b-2a^4} + \frac{1}{2a^4+2a^3b};</math></p>     | <p><math>\frac{a^2+ab+b^2}{a^3-b^3} - \frac{a^2-ab+b^2}{a^3+b^3};</math> <span style="float: right;"><math>\left[\frac{2}{a^4-b^4}; \frac{2b}{a^2-b^2}\right]</math></span></p>                 |
| <p><b>100.</b> <math>\frac{13a-29b}{5(a-b)} - \frac{7(b-3a)}{5a-5b} + \frac{9b-11a}{5b-5a};</math></p> | <p><math>\frac{1}{x^2-7x+12} + \frac{2}{x^2-4x+3} - \frac{3}{x^2-5x+4};</math> <span style="float: right;"><math>[9; 0]</math></span></p>   |
| <p><b>101.</b> <math>\frac{b^2}{a^2-b^2} + \frac{a^2}{a^2+b^2} - \frac{a^2b^2}{a^4-b^4};</math></p>    | <p><math>\frac{1}{a^2+ab} + \frac{2b}{a^3-ab^2} + \frac{1}{ab-b^2};</math> <span style="float: right;"><math>\left[\frac{a^4-a^2b^2+b^4}{a^4-b^4}; \frac{a+b}{ab(a-b)}\right]</math></span></p> |

<sup>(1)</sup> Conviene specificare, per esercizio, l'insieme di esistenza delle singole frazioni e della somma.

## FRAZIONI ALGEBRICHE - 2

102.  $\frac{q^3 - p^2q}{pq(p-q)^3} + \frac{p+q}{q(p-q)^2} - \frac{2}{p(p-q)}.$   $\left[ \frac{1}{pq} \right]$
103.  $\frac{2m+1}{m^2-1} - \frac{3m-1}{m^2+m-2} + \frac{m+3}{m^2+3m+2}.$   $\left[ \frac{5m}{(m+2)(m^2-1)} \right]$
104.  $\frac{1}{9x^2-1} - \frac{2}{9x^2-6x+1} + \frac{1}{9x^2+6x+1}.$   $\left[ \frac{-2(9x+1)}{(9x^2-1)^2} \right]$
105.  $\frac{y-1}{x-8} - \frac{x+2}{y+4} + \frac{3(y-4)}{4x+xy-32-8y}.$   $\left[ \frac{(x+y)(y-x+6)}{(x-8)(y+4)} \right]$
106.  $\frac{1}{a-b} + \frac{a}{b^2-a^2} - \frac{1}{a^2+a-ab-b}.$   $\left[ \frac{a(b-1)}{(a^2-b^2)(a+1)} \right]$
107.  $\frac{a+3b}{a^2+ab} + \frac{b^2-8ab-5a^2}{5a^3+5a^2b} + \frac{a-5b}{5a^2+5ab}.$   $\left[ \frac{a+b}{5a^2} \right]$
108.  $\frac{x-3}{x^2+6x+8} - \frac{x-2}{x^2+7x+12} + \frac{5}{x^2+5x+6}.$   $\left[ \frac{5}{x^2+6x+8} \right]$
109.  $\frac{2a}{a^4-a^2+1} - \frac{1}{a^2-a+1} + \frac{1}{a^2+a+1}.$   $\left[ \frac{4a^3}{a^8+a^4+1} \right]$
110.  $\frac{2+3x-5x^2}{x^3-1-3x(x-1)} - \frac{2x+5}{x^2+1-2x} + \frac{1}{x-1}.$   $\left[ \frac{2(4-x-3x^2)}{(x-1)^3} \right]$
111.  $\frac{x}{x^2-1} + \frac{x^2+x-1}{x^3-x^2+x-1} + \frac{x^2-x-1}{x^3+x^2+x+1} - \frac{x^3}{x^4-1}.$   $\left[ \frac{x(2x^2+1)}{x^4-1} \right]$
112.  $\frac{3x-5}{3x-3} - \frac{2x-7}{2x+2} - \frac{5x-13}{6x^2-6}; \quad \frac{4+2x}{x^2-4} + \frac{x}{x^2-5x+6} + \frac{3}{3-x}.$   $\left[ \frac{3}{x+1}; 0 \right]$
113.  $\frac{2a+2b}{a^2+b^2} + \frac{1}{a-b} - \frac{2a}{a^2-b^2} - \frac{1}{a+b}.$   $\left[ \frac{4ab}{(a+b)(a^2+b^2)} \right]$
114.  $\frac{2b}{(a-b)(a+2b)} + \frac{a+b}{a^2+ab-2b^2} + \frac{b^2}{(a^2-b^2)(a+2b)}.$   $\left[ \frac{a+2b}{a^2-b^2} \right]$
115.  $\frac{2}{a^2-2a-3} + \frac{1}{a^2-4a+3} - \frac{a}{1-a^2}.$   $\left[ \frac{1}{a-3} \right]$
116.  $\frac{1}{(x+1)(x+2)} - \frac{1}{(x+1)(x+2)(x+3)} - \frac{1}{(x+1)(x+3)}.$  [0]
117.  $\frac{x+1}{ax-bx-a+b} - \frac{x+1}{ax+bx-a-b} + \frac{4b}{(1-x)(a^2-b^2)}.$   $\left[ \frac{2b}{a^2-b^2} \right]$
118.  $\frac{2p}{q^2+2q+1-p^2} + \frac{1}{p+q+1} - \frac{1}{q+1-p}.$  [0]
119.  $\frac{2p}{q^2-4q+4-p^2} + \frac{1}{p+q-2} + \frac{1}{q-p-2}.$   $\left[ \frac{2}{q-p-2} \right]$
120.  $\frac{a^2}{a^2-ab-ac+bc} + \frac{b^2}{b^2-bc-ab+ac} + \frac{c^2}{c^2-ac-bc+ab}.$  [1]
121.  $\frac{a-1}{a^2-a-2} - \frac{1}{(a+1)(2a-3)} + \frac{3a-7}{2a^3-5a^2-a+6}.$   $\left[ \frac{2a+1}{2a^2-a-3} \right]$

## FRAZIONI ALGEBRICHE - 2

Eseguire le seguenti **moltiplicazioni** di frazioni algebriche.

$$159. \quad 4a \cdot \frac{ax}{2a^2} \cdot \left(-\frac{3ay}{b}\right) \cdot \left(-\frac{b}{6xya}\right); \quad 6a \cdot \frac{2ab}{a} \cdot \left(-\frac{p^2}{b^2}\right) \cdot \left(-\frac{b}{12ap^2}\right). \quad [1; 1]$$

$$160. \quad \frac{4x}{3y^2} \cdot \frac{12y^8}{5x^2z} \cdot \frac{5x^3z^4}{8x^2y^6} \cdot \left(-\frac{3x^2}{2yz^3}\right); \quad -\frac{4x^5y^3z^2}{3a^4b^2} \cdot \frac{6a^5b}{x^4y^2z^3} \cdot 3x^2y \cdot \left(-\frac{z}{8x^3y^2}\right) \cdot \left[-\frac{3x^2}{y}; \frac{3a}{b}\right]$$

$$161. \quad \frac{a^2-9}{6} \cdot \frac{3a}{a+3}; \quad \frac{4x-16}{8x} \cdot \frac{8x}{2x-8}. \quad \left[\frac{a^2-3a}{2}; 2\right]$$

$$162. \quad \frac{a+b+(a^2-b^2)}{(a+b)^2} \cdot \frac{(a+b)a}{a^2-ab+a}; \quad \frac{ax-xy+a-y}{ax+xy-a-y} \cdot \frac{xy+x-y-1}{xy+x+y+1}. \quad \left[1; \frac{a-y}{a+y}\right]$$

$$163. \quad \frac{x^3+y^3+3xy(x+y)}{x^2-y^2} \cdot \frac{x+y}{x^2+y^2+2xy}; \quad \frac{a^2+4ab+4b^2}{a^4-16b^4} \cdot \frac{a^2+4b^2}{4a+8b}. \quad \left[\frac{x+y}{x-y}; \frac{1}{4(a-2b)}\right]$$

$$164. \quad \frac{a^2+4ab+4b^2}{4a^2-4ab+b^2} \cdot \frac{2a-b}{a+2b}; \quad \frac{a^2-7a+12}{a^2-16} \cdot \frac{a+4}{a-3}. \quad \left[\frac{a+2b}{2a-b}; 1\right]$$

$$165. \quad \frac{2a+6}{2a^2-6a+4} \cdot \frac{a^2-a-2}{a^2+a+1} \cdot \frac{a^3-1}{a^2+4a+3}; \quad \frac{x^3-27y^3}{x^2-9y^2} \cdot \frac{x^2+6xy+9y^2}{x^2+3xy+9y^2} \cdot \frac{2}{2x+6y}. \quad [1; 1]$$

$$166. \quad \frac{a^2-4ab+4b^2}{4c^2} \cdot \frac{2a^2c^2+8b^2c^2}{a^4-16b^4} \cdot \frac{2a+4b}{c}; \quad \frac{a^4-b^4}{a^3+ab^2} \cdot \frac{a-b}{a^2+ab} \cdot \frac{a^2}{a^2-2ab+b^2}. \quad \left[\frac{a-2b}{c}; 1\right]$$

$$167. \quad \frac{m^3n-m^2n}{m^2-1} \cdot \frac{m^4-1}{m^3n-m^3n^2} \cdot \frac{1-n}{m^2+1}; \quad \frac{x+y}{y-x} \cdot \frac{x^3-y^3}{x^3+y^3} \cdot \frac{(x-y)^2+xy}{(x+y)^2-xy}. \quad \left[\frac{m-1}{m}; -1\right]$$

$$168. \quad \frac{4y^2-4x^2-a^2y^2+a^2x^2}{25x^2y^2} \cdot \frac{2-a}{2y-2x+ay-ax} \cdot \frac{5xy}{4-4a+a^2}. \quad \left[\frac{y+x}{5xy}\right]$$

$$169. \quad \frac{(a^2-x^2)^2}{a^5b^4-a^4b^5} \cdot \frac{a^3-2a^2b+ab^2}{a^2b(a+x)^3} \cdot \frac{a^5b^5}{a^2-ab-ax+xb}. \quad \left[\frac{a-x}{a+x}\right]$$

$$170. \quad \frac{x^5y-x^2y^4}{(x+y)^3} \cdot \frac{(x^2+2xy+y^2)^2}{(x+y)^2-xy} \cdot \frac{1}{x^4y^3}. \quad \left[\frac{x^2-y^2}{x^2y^2}\right]$$

$$171. \quad \frac{x^2-(m+n)x+mn}{x^2-(a+m)x+am} \cdot \frac{x^2-a^2}{x^2-n^2}. \quad \left[\frac{x+a}{x+n}\right]$$

$$172. \quad \frac{a^3-b^3}{a^3+b^3} \cdot \frac{a+b}{a-b} \cdot \left(\frac{a^2-ab+b^2}{a^2+ab+b^2}\right)^2. \quad \left[\frac{a^2-ab+b^2}{a^2+ab+b^2}\right]$$

$$173. \quad \frac{a^3+b^3+3a(a+b)}{a^2-b^2} \cdot \frac{a+b}{a^2+b^2+2ab}. \quad \left[\frac{a+b}{a-b}\right]$$



## FRAZIONI ALGEBRICHE - 2

$$196. \left( \frac{1+x}{1-x} - \frac{1-x}{1+x} \right) \cdot \left( \frac{3}{4x} + \frac{x}{4} - x \right). \quad [3]$$

$$197. \frac{1}{(a+b)^2} \cdot \left( \frac{1}{a^2} + \frac{1}{b^2} \right) + \frac{2}{(a+b)^2} \cdot \left( \frac{1}{a} + \frac{1}{b} \right). \quad \left[ \frac{1}{a^2 b^2} \right]$$

$$198. \left[ \left( \frac{x+a}{x-a} + \frac{x-a}{x+a} \right) \cdot \frac{x^2 - a^2}{x^2 + a^2} + \frac{x}{a} + \frac{a}{x} \right] \cdot \frac{x}{a+x}. \quad \left[ \frac{x+a}{a} \right]$$

$$199. \left[ \left( \frac{a}{a+b} + \frac{a}{a-b} \right) \left( \frac{b}{a-b} - \frac{b}{a+b} \right) + 1 \right] \cdot \frac{(a-b)^2}{(a^2 + b^2)^2}. \quad \left[ \frac{1}{(a+b)^2} \right]$$

$$200. \frac{x^2(1-x^2)}{1+x^3} \cdot \left( \frac{1}{x} - \frac{1}{x^2} + \frac{1}{x^3} \right) - \frac{x^2}{2-x} \left( \frac{1}{x} - \frac{2}{x^2} \right) \cdot \left( \frac{2}{1-x} - \frac{x}{x-1} + \frac{1+x^2}{x^2-x} \right). \quad [0]$$

$$201. \left( \frac{2}{x+4} - \frac{x-3}{x^2-4x+16} + \frac{x^2}{x^3+64} \right) \cdot \frac{(x-4)^2+4x}{2x^2-9x+44} - \left( \frac{1}{2x+8} - \frac{1}{2x-3} + \frac{4x+5}{4x^2+10x-24} \right) \cdot [0]$$

$$202. \left( \frac{2xy}{x^2+xy+y^2} - 1 \right) \left( 1 - \frac{2y^3}{x^3+y^3} \right) + \left( \frac{y}{y-x} - \frac{x}{x+y} \right) \cdot \frac{2y(x+y)}{x^2+y^2} + \frac{4y^2}{x^2-y^2}. \quad [-1]$$

$$203. \left[ \left( \frac{x}{y} - \frac{y}{x} \right) \left( \frac{x^3}{y^3} + \frac{y^3}{x^3} + \frac{x}{y} + \frac{y}{x} \right) \left( \frac{y^2}{y^2-x^2} - \frac{3x^2y^2}{y^4-x^4} - \frac{y^2}{x^2+y^2} \right) - 2 \right] \cdot \frac{xy}{x^2-y^2}. \quad \left[ \frac{x^2-y^2}{xy} \right]$$

$$204. \left[ \left( \frac{a+b}{2a-2b} - \frac{a-b}{2a+2b} - \frac{2b^2}{b^2-a^2} \right) \cdot \frac{a-b}{2b} + \frac{a}{b} \right] \cdot \frac{b}{a+b}. \quad [1]$$

Eseguire i seguenti **elevamenti a potenza** di frazioni algebriche.

$$205. \left( \frac{2x^2a}{yb^3} \right)^3; \quad \left( -\frac{4ab}{5xy} \right)^2; \quad \left( -\frac{2ab^2c^3}{3x^3y} \right)^3.$$

$$206. \left[ \frac{(a+b)^3}{x+2y} \right]^2; \quad \left[ -\frac{(a-b)^2}{3x+y} \right]^3; \quad \left[ \frac{2(a+b)^3}{(x+y)^2} \right]^3.$$

Semplificare le seguenti espressioni contenenti **elevamenti a potenza** di frazioni algebriche.

$$207. \left( \frac{a-b}{m-n} \right)^2 \cdot \frac{m^2-n^2}{a-b} \left( \frac{1}{am+an} \right)^2. \quad \left[ \frac{a-b}{a^2m^2-a^2n^2} \right]$$

$$208. \left( \frac{y}{a^3} - \frac{1}{a} \right)^6 \cdot \left( \frac{a}{y-a^2} \right)^5 \cdot \left( \frac{a^8}{y-a^2} \right)^2. \quad \left[ \frac{a^3}{y-a^2} \right]$$

$$209. \left( \frac{t}{t+a} + \frac{3a}{t-a} \right) \cdot \left( \frac{t}{t+a} + \frac{3a^2+3at}{t^2-a^2} \right)^{-1}; \quad \left( \frac{2}{x-a} - \frac{1}{a+x} \right) \frac{x-a}{y} \left( \frac{x+a}{3a+x} \right)^2. \quad \left[ 1; \frac{x+a}{3ay+yx} \right]$$

$$210. \left( \frac{a^2-x^2}{a^3-a^2b} \right)^3 \cdot \frac{a^5(a^2-b^2)^2}{(a+x)^4} \cdot \frac{a^2+ax}{a^2+2ab+b^2}. \quad \left[ \frac{(a-x)^3}{a-b} \right]$$

$$211. \left( \frac{a-b}{m-n} \right)^2 \cdot \frac{m^2-n^2}{a-b} \left( \frac{1}{am+an} \right)^2. \quad \left[ \frac{a-b}{a^2m^2-a^2n^2} \right]$$

$$212. \left[ \frac{x}{x-y} - \frac{y}{x+y} - \frac{(x-y)^2}{x^2-y^2} \right] \cdot \left( \frac{x+y}{x} \right)^2 \cdot \frac{y}{2x^2+2xy}. \quad \left[ \frac{y^2}{x^3-x^2y} \right]$$

$$213. \left( \frac{a}{a-b} - \frac{b}{a+b} \right) \cdot \left( \frac{a^2}{a^2-b^2} - \frac{a}{a+b} \right)^{-2} \cdot \frac{1}{a^3-ab^2}. \quad \left[ \frac{a^2+b^2}{a^3b^2} \right]$$

$$214. \left( \frac{1}{a} + \frac{1}{b} \right)^2 \left( \frac{1}{c} - \frac{1}{a} \right)^{-2} \left( \frac{a}{c} + \frac{b}{a+b} \right)^2. \quad \left[ \frac{(a^2+ab+bc)^2}{b^2(a-c)^2} \right]$$

## FRAZIONI ALGEBRICHE - 2

Semplificare le seguenti espressioni contenenti addizioni, moltiplicazioni e divisioni di frazioni algebriche.

$$232. \left(\frac{1}{a} + \frac{1}{b}\right) : \left(\frac{1}{a^2} - \frac{1}{b^2}\right); \quad \frac{x^3 - y^3}{x^2 y^2} : \left(\frac{1}{y^2} + \frac{1}{xy} + \frac{1}{x^2}\right) \cdot \frac{1}{x - y}. \quad \left[\frac{ab}{b - a}; 1\right]$$

$$233. \left(y^2 - \frac{1}{x^2}\right) : \frac{x^2 y^2 + 1 - 2xy}{x^5}; \quad \left(1 - \frac{1}{b^2}\right) : \frac{b + 1}{b}. \quad \left[\frac{x^3(xy + 1)}{xy - 1}; \frac{b - 1}{b}\right]$$

$$234. \left(x^2 - \frac{1 - x^2}{y^2 - 1}\right) : \frac{x^2 y^2 + 2xy + 1}{y^2 + 2y + 1}; \quad \left[t^2 - \left(\frac{a}{b}\right)^2\right] : \frac{bt + a}{b^2}. \quad \left[\frac{(xy - 1)(y + 1)}{(y - 1)(xy + 1)}; bt - a\right]$$

$$235. \left(1 - \frac{x^3}{y^3}\right) : \left(1 - \frac{x}{y}\right) - \left(1 + \frac{x}{y}\right)^2; \quad \left(\frac{1}{a} + \frac{1}{b} - \frac{2}{a + b}\right)^3 : \left(\frac{a}{b} + \frac{b}{a}\right)^3. \quad \left[-\frac{x}{y}; \frac{1}{(a + b)^3}\right]$$

$$236. \frac{xy(y - x)}{x + y} : \left[\left(\frac{y}{x} - \frac{x}{y}\right) : \left(\frac{1}{y} + \frac{1}{x}\right)^2\right]; \quad \left(\frac{1}{x} + \frac{1}{y}\right) : \left(\frac{1}{x} - \frac{1}{y}\right) : \frac{2y + 2x}{x^2 - 2xy + y^2}. \quad \left[1; \frac{y - x}{2}\right]$$

$$237. \left(\frac{x}{x - y} + \frac{y}{x + y}\right) : \left(\frac{x}{x - y} - \frac{y}{x + y}\right); \quad \left(2 - \frac{2m - n}{m - n}\right) : \left(\frac{m + n}{m - n} - 1\right). \quad \left[\frac{x^2 + 2xy - y^2}{x^2 + y^2}; -\frac{1}{2}\right]$$

$$238. \frac{r^2 - s^2}{r^2 s + rs^2} : \left(\frac{r}{s} \cdot \frac{r^2 - s^2}{2r}\right); \quad \left(\frac{2x}{x - b} - \frac{2b}{x + b}\right) : \left(\frac{3x}{x - b} - \frac{3b}{x + b}\right). \quad \left[\frac{2}{r(r + s)}; \frac{2}{3}\right]$$

$$239. \left[\frac{x^4 - y^4}{x^2 y^2} : \left(\frac{x}{y} + \frac{y}{x}\right)\right] \cdot \left(\frac{1}{x - y} - \frac{1}{x + y}\right). \quad \left[\frac{2}{x}\right]$$

$$240. \left(\frac{a^2 - a}{a - 2} : \frac{a^2 - 3a}{a - 2}\right) : \left(\frac{a}{a - 3} - 1\right); \quad \left[\frac{x^4 - y^4}{(x - y)^2} : \frac{x^2 + xy}{x - y}\right] : \left(x + \frac{y^2}{x}\right). \quad \left[\frac{a - 1}{3}; 1\right]$$

$$241. \left[\left(\frac{a^2 + b^2}{ab} + 2\right) : \left(\frac{a^2 + b^2}{ab} - 2\right)\right] : \frac{1}{(a - b)^2}. \quad [(a + b)^2]$$

$$242. \left[\left(\frac{x^2 + y^2}{x^2 - y^2} - 1\right) : \left(\frac{x^2 - y^2}{x^2 + y^2} + 1\right)\right] \cdot \left(\frac{1}{x^2} - \frac{1}{y^2}\right). \quad \left[-\frac{x^2 + y^2}{x^4}\right]$$

$$243. \left(\frac{5a}{5a + 2b} + \frac{2b}{5a - 2b}\right) : \left(\frac{5a}{5a - 2b} - \frac{2b}{5a + 2b}\right). \quad [1]$$

$$244. \left(\frac{2a + 1}{a - 3} : \frac{3a - 1}{a + 3} - \frac{2a}{a + 1}\right) : \left(\frac{2a - 1}{a + 3} - \frac{2a - 5}{a + 1} - \frac{14}{a^2 + 4a + 3}\right). \quad [Impossibile]$$

$$245. \left[\left(\frac{a - 3b}{a - 2b} - \frac{2a + 4b}{2a + 3b}\right) \cdot \frac{a - 2b}{3a + b} + \frac{b}{2a - 3b}\right] : \frac{b^2}{4a^2 - 9b^2}. \quad [6]$$

$$246. \left[\left(a + \frac{1}{a + b}\right) : \frac{a + b}{ab + a^2 + 1}\right] : \frac{a^4 + a^2 b^2 + 1 + 2a^3 b + 2a^2 + 2ab}{(a + b)^2}. \quad [1]$$

$$247. \left[\left(x - \frac{1}{x}\right) : \frac{x^4 - 1}{x^3 y^2}\right] : \frac{xy}{x^2 + 1}. \quad [xy]$$

$$248. \left(p + \frac{q - p}{1 + pq}\right) : \left(1 - \frac{1 + pq}{pq - p^2}\right); \quad \left(\frac{m^3}{n^3} - \frac{n^3}{m^3}\right) : \left(\frac{m}{n} - \frac{n}{m}\right). \quad \left[\frac{pq(p - q)}{1 + pq}; \frac{m^4 + m^2 n^2 + n^4}{m^2 n^2}\right]$$

$$249. \left[\left(\frac{a + 2}{a - 1} - \frac{a - 3}{a + 1}\right) \cdot \frac{1}{14a - 2} + \frac{1}{8a + 8} \cdot \left(1 - \frac{1}{a}\right)\right] : \frac{a + 1}{64a^2}. \quad \left[\frac{8a}{a - 1}\right]$$

## FRAZIONI ALGEBRICHE - 2

- 250.**  $\left[ \left( a + \frac{a}{a+2} \right) : \left( a - \frac{a}{a-2} \right) - 1 \right] : \left( \frac{a+1}{a-3} - \frac{a+4}{a+2} \right).$   $\left[ \frac{a}{a+7} \right]$
- 251.**  $\left[ \left( \frac{x+y}{x-y} + \frac{x-y}{x+y} \right) : \left( \frac{x^2+xy}{y} + \frac{xy+y^2}{x} \right) \right] \cdot \left( \frac{1}{y} + \frac{1}{x} \right).$   $\left[ \frac{2}{x^2-y^2} \right]$
- 252.**  $\left( \frac{x+y}{x-y} - 1 \right) : \left( 1 - \frac{x-y}{x+y} \right); \quad \left( \frac{a^2-a}{a-3} : \frac{a^3-a}{5a-15} \right) : \left( \frac{1}{a-1} - \frac{1}{a+1} \right).$   $\left[ \frac{x+y}{x-y}, \frac{5(a-1)}{2} \right]$
- 253.**  $\left( \frac{a^3-a^2}{a-5} : \frac{a^5-a^3}{2a-10} \right) : \left( \frac{1}{2a} - \frac{1}{2a+2} \right).$  [4]
- 254.**  $\left[ \left( \frac{a+b}{a-2} + 2 \right) : \left( \frac{a+b}{a-2} - 2 \right) \right] : \frac{1}{a-b-4}.$  [4 - 3a - b]
- 255.**  $\left( \frac{b}{a^2-3ab+2b^2} + \frac{3b}{a^2+ab-6b^2} \right) : \left( \frac{3a}{a^2+2ab-3b^2} - \frac{a}{a^2-b^2} \right).$   $\left[ \frac{2b \cdot (a+b)}{a(a-2b)} \right]$
- 256.**  $\left( \frac{2x-3y}{x^2-y^2} - \frac{2}{x+y} + \frac{y^3}{x^4+xy^3-x^3y-y^4} + \frac{2xy}{x^3+y^3} \right) : \left( \frac{x+y}{x^2-xy+y^2} - \frac{1}{x+y} \right).$   $\left[ \frac{1}{3} \right]$
- 257.**  $\left( \frac{a+2}{a^2-9a+14} - \frac{5-a}{a^2-7a+10} + \frac{5-a}{a^2-12a+35} \right) : \left( \frac{7-9a}{a^2-6a-7} + \frac{a+2}{a-7} \right).$   $\left[ \frac{a+1}{(a-2) \cdot (a-3)} \right]$
- 258.**  $\left( \frac{a^2+4b^2}{a^3+2a^2b-ab^2-2b^3} + \frac{a+b}{a^2+ab-2b^2} - \frac{a-b}{a^2+3ab+2b^2} \right) : \frac{a^2+7ab+10b^2}{a^2-b^2}.$   $\left[ \frac{1}{a+5b} \right]$
- 259.**  $\left[ \frac{ax}{b^2+x^3} \cdot \left( \frac{ab^3}{xy} - \frac{ax^5}{by} - \frac{b^3y}{ax} + \frac{x^5y}{ab} \right) \right] : \left( \frac{ab}{y} - \frac{ax^3}{by} + b - \frac{x^3}{b} \right).$  [a - y]
- 260.**  $\left[ \left( \frac{x^2}{y^2} + 1 + \frac{y^2}{x^2} \right) : \left( \frac{x}{y} + 1 + \frac{y}{x} \right) - 1 \right] : (x-y)^2.$   $\left[ \frac{1}{xy} \right]$
- 261.**  $\left[ \left( \frac{1}{a-b} + \frac{1}{a+b} \right) : \frac{ab}{a^2-b^2} - 1 \right] : (2-b)^2.$   $\left[ \frac{1}{b(2-b)} \right]$
- 262.**  $\left[ \left( \frac{x^2}{y^2} + \frac{1}{x} \right) : \left( \frac{x}{y^2} - \frac{1}{y} + \frac{1}{x} \right) - 1 \right] \cdot y.$  [x]
- 263.**  $\left[ \left( a + \frac{b-a}{1+ab} \right) : \left( 1 - \frac{ab-a^2}{1+ab} \right) + a \right]^2 : (a^3+b^3).$   $\left[ \frac{a+b}{a^2-ab+b^2} \right]$
- 264.**  $\left[ \left( \frac{1}{1+x} + \frac{x}{1-x} \right) : \left( \frac{1}{1-x} - \frac{x}{1+x} \right) - y \right] : (1-y^2).$   $\left[ \frac{1}{1+y} \right]$
- 265.**  $\left[ \frac{22(a-b)^2}{21(a+b)} \cdot \frac{28}{33(b-a)} \cdot \left( -\frac{a+b}{8} \right) - \frac{a-b}{9} \right] : \frac{a^5+1}{a^4-1}.$  [0]
- 266.**  $\left[ \left( \frac{a}{a+b} + \frac{b}{a-b} \right) : \left( \frac{b}{a+b} - \frac{a}{a-b} \right) + b^2 \right] : (1-b) + b.$  [-1]
- 267.**  $\left\{ \left[ (1+x)^2 : \left( 1 + \frac{1}{x} \right) - x \right] : \frac{x}{x+1} - x \right\} : \frac{x}{x+1}.$  [x(x+1)]
- 268.**  $\left( \frac{a}{b} + \frac{b}{a} \right) : \left( \frac{a}{b} - \frac{b}{a} \right) + 1 : \left( 1 + \frac{b}{a} \right) - 1 : \left( 1 - \frac{b}{a} \right).$   $\left[ \frac{a-b}{a+b} \right]$
- 269.**  $\left( 1 - \frac{x-3y}{x+y} \right) : \left( \frac{3x+y}{x-y} - 3 \right) - \left( \frac{y-2x}{x^2+y^2+2xy} - \frac{2}{x+y} \right) : \left( \frac{3}{y-x} - \frac{2y-x}{y^2-x^2} \right).$  [0]



## FRAZIONI ALGEBRICHE - 2

$$303. \left[ \left( 1 - \frac{m}{m+n} \right) : \left( 1 - \frac{n}{m+n} \right) \right]^2 : \left[ \left( 1 - \frac{1}{m} \right) \left( 1 + \frac{1}{m} \right) \right] + \frac{1}{1-m^2}. \quad \left[ \frac{n^2-1}{m^2-1} \right]$$

$$304. \left[ \left( a + \frac{1}{a+1} \right)^2 + \left( a - \frac{1}{a+1} \right)^2 - \frac{2}{(a+1)^2} \right] \left( \frac{1}{a^3} + \frac{1}{a^2} \right). \quad \left[ \frac{2(1+a)}{a} \right]$$

$$305. \frac{8x^2+8x}{3x-3} : \left( \frac{3x}{2x-2} + \frac{2x}{3x-3} - \frac{x^2-7x}{6x^2-6} \right). \quad \left[ \frac{4}{3}(x+1) \right]$$

$$306. \left( \frac{\frac{a+b}{a-b} : \frac{a^3-b^3}{a^2-b^2}}{\frac{a^3-b^3}{a+b}} \right) : \frac{b-a}{a+b}. \quad \left[ \frac{a+b}{a-b} \right]$$

$$307. \frac{\left( \frac{a}{b} - \frac{b}{a} \right) : \left( \frac{1}{b} + \frac{1}{a} \right)}{\left( \frac{a^2}{b^2} - \frac{b^2}{a^2} \right) : \left( \frac{1}{b^2} + \frac{1}{a^2} \right)} : \left( 1 - \frac{2b}{a+b} \right). \quad \left[ \frac{1}{a-b} \right]$$

$$308. \frac{\left( \frac{a}{b} - \frac{b}{a} \right)^2 : \left( \frac{1}{b} + \frac{1}{a} \right)^2}{\left( \frac{a^2}{b^2} - \frac{b^2}{a^2} \right) : \left( \frac{1}{b^2} + \frac{1}{a^2} \right)} : \left( 1 - \frac{2b}{a+b} \right)^2. \quad \left[ \frac{a+b}{a-b} \right]$$

$$309. \left( \frac{a + \frac{b^2}{a-b}}{b + \frac{a^2}{a+b}} : \frac{a + \frac{b^2}{a-b}}{a+b} \right) \frac{a^3-b^3}{a+b} + \frac{1 - \left( \frac{a}{b} \right)^2}{\left( \frac{1}{b} \right)^2}. \quad [0]$$

$$310. \frac{\frac{2x+y}{x-y} + \frac{x-3y}{x+y}}{x - \frac{2xy-4(x^2+y^2)}{y-x}} : \left[ 3x^2 \left( \frac{x}{x^2-y^2} - \frac{1}{x+y} \right) \right]. \quad \left[ \frac{y-x}{3x^2y} \right]$$

$$311. \left( \frac{2x-1}{x-2} - \frac{x+2}{x^2-1} - \frac{5+2x^2}{x^2-3x+2} \right) : \frac{\frac{2}{2-x} - 1}{\frac{x+1}{4x+7}}. \quad \left[ \frac{1}{x-1} \right]$$

$$312. \left( \frac{a^2+b^2-ab}{a^2-b^2} + \frac{a^3}{b^3-a^3} \right) : \left[ b \left( 1 - \frac{ab}{a^2+ab+b^2} \right) - \frac{a^3}{a^2+ab+b^2} \right]. \quad \left[ \frac{b}{a^2-b^2} \right]$$

$$313. \left( \frac{2b^3-2a^3}{a^3+b^3} + \frac{2a}{a+b} - \frac{2b}{b-a} \right) \cdot \left( \frac{a}{16b} - \frac{b}{16a} \right) \cdot \left( \frac{a^2}{b} + \frac{b^2}{a} \right). \quad \left[ \frac{a+b}{4} \right]$$

$$314. \left( \frac{-4a^3}{(a+b)^3} + \frac{a^2+b^2}{(a+b)^2} + \frac{a-b}{a+b} \right) : \left( 1 - \frac{\frac{b}{a+b}}{1 - \frac{2a}{3a+b}} \right). \quad \left[ -\frac{2a}{a+b} \right]$$

$$315. \left( \frac{4}{a-2b} + \frac{2b-3a}{4b^2-a^2} + \frac{2a-3b}{a^2-ab-2b^2} \right) : \frac{a - \frac{2ab}{a+2b}}{1 - \frac{9a+13b}{9a+14b}}. \quad \left[ \frac{b}{a(a-2b)(a+b)} \right]$$

## FRAZIONI ALGEBRICHE - 2

$$330. \frac{\frac{y^2-1}{y-3} + y - 1}{\frac{y+y^2-12}{y-3} + 3y} : \left[ \frac{1 + \frac{3}{y-4}}{1 + \frac{1 - \frac{y-5}{2y+1}}{\frac{y-4}{2y+1}}} \right]^2. \quad \left[ \frac{2(y+1)}{y-3} \right]$$

$$331. \left( \frac{2}{x} - \frac{(y+z)^2}{xyz} + \frac{2}{y} - \frac{x}{yz} + \frac{y}{xz} + \frac{z}{xy} \right) : \left( \frac{4z}{y^2} - \frac{\frac{x+y}{y} - 1}{\frac{yz}{x}} \right). \quad \left[ \frac{y}{2z+x} \right]$$

$$332. \left\{ \left[ \left( b + \frac{1}{b-1} \right) \left( \frac{1}{b} + \frac{1}{b^2} \right) \right]^{-1} + \frac{b-1}{b^2-b+1} \right\} : \left( b^2 - b + 1 - \frac{2}{b+1} \right). \quad \left[ \frac{1}{b^2-b+1} \right]$$

$$333. \left[ \left( \frac{u}{u-2v} \right)^2 \left( \frac{2v}{u} - 1 \right) - \left( \frac{2u-v}{2v-u} + 1 \right) \right]^{-2} \cdot \left( 2 - \frac{u}{v} \right)^{-3}. \quad \left[ \frac{v}{2v-u} \right]$$

$$334. \left( \frac{\frac{25x^2}{5x-2y} - 5x}{\frac{2y}{5x+2y}} : \frac{\frac{10y^2}{5x-2y}}{5 + \frac{2y}{x}} + 2 - \frac{25x^2}{2y^2} \right) : \frac{2y+5x}{\frac{y}{2}}. \quad [1]$$

$$335. \frac{\frac{2a+b}{a-b} + \frac{a-3b}{a+b}}{a - \frac{2ab-4(a^2+b^2)}{b-a}} : \left[ 3a^2 \left( \frac{a}{a^2-b^2} - \frac{1}{a+b} \right) \right]. \quad \left[ \frac{b-a}{3a^2b} \right]$$

$$336. \left( \frac{2}{3(1+t)} + 4t - \frac{\frac{1-t}{3}}{t+2} \right)^2 : \left\{ \frac{13}{9} \left[ (t-2)(t^2+4) + \frac{16}{t+2} \right] \right\}. \quad \left[ \frac{13(t+2)}{t^2} \right]$$

$$337. \left( \frac{2y-1}{y-2} - \frac{y+2}{y^2-1} - \frac{5+2y^2}{y^2-3y+2} \right) : \frac{\frac{2}{2-y} - 1}{\frac{y+1}{4y+7}}. \quad \left[ \frac{1}{y-1} \right]$$

$$338. \left( \frac{a^2+b^2-ab}{a^2-b^2} + \frac{a^3}{b^3-a^3} \right) : \left[ b \left( 1 - \frac{ab}{a^2+ab+b^2} \right) - \frac{a^3}{a^2+ab+b^2} \right]. \quad \left[ \frac{b}{a^2-b^2} \right]$$

$$339. \left( \frac{2y^3-2x^3}{x^3+y^3} + \frac{2x}{x+y} - \frac{2y}{y-x} \right) \cdot \left( \frac{x}{16y} - \frac{y}{16x} \right) \cdot \left( \frac{x^2}{y} + \frac{y^2}{x} \right). \quad \left[ \frac{x+y}{4} \right]$$

$$340. \left( \frac{-4p^2}{(p+q)^3} + \frac{p^2+q^2}{(p+q)^2} + \frac{p-q}{p+q} \right) : \left( 1 - \frac{\frac{q}{p+q}}{1 - \frac{2p}{3p+q}} \right). \quad \left[ -\frac{2p}{p+q} \right]$$

$$341. \left( \frac{4}{a-2b} + \frac{2b-3a}{4b^2-a^2} + \frac{2a-3b}{a^2-ab-2b^2} \right) : \frac{a - \frac{2ab}{a+2b}}{1 - \frac{9a+13b}{9a+14b}}. \quad \left[ \frac{b}{a(a-2b)(a+b)} \right]$$