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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Esercizi proposti

Eseguire le seguenti **divisioni** *(o moltiplicazioni) tra frazioni algebriche.*

215. $\left(\frac{4x^2y}{5a^2b} : \frac{2xy^2}{15ab^2}\right) \cdot \left(\frac{y}{6x} : \frac{b}{a}\right)$; $\left(-\frac{5x^3y^2z}{4a^3b^3} : \frac{10x^4y^5z^3}{3a^4b^5}\right) \cdot \left(-\frac{8xy^3z^2}{ab^2}\right)$. [1; 3]

216. $\frac{16a^5b^7}{(3+t)^5} : \frac{(2ab)^6}{(9-t^2)^4}$; $\frac{(a+b)^2}{a-b} : \frac{a+b}{(a-b)^2}$. $\left[\frac{b(3-t)^4}{4a(3+t)}; a^2-b^2\right]$

217. $\frac{5x-2}{x-3} : \frac{x+2}{4x-12}$; $\frac{a^2-b^2}{ab} : \frac{(a+b)^2}{a^2}$. $\left[\frac{4(5x-2)}{x+2}; \frac{a(a-b)}{b(a+b)}\right]$

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

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

220. $\frac{x-y}{3y} : \frac{x^2-y^2}{4xy}$; $\frac{2a-8}{3a-15} : \frac{a^2-16}{a^2-25}$. $\left[\frac{4x}{3(x+y)}; \frac{2(a+5)}{3(a+4)}\right]$

221. $\frac{x^2+3x}{4xy-16y} : \frac{x+3}{3x-12}$; $\frac{a^2-4a+4}{3a^2-27} : \frac{a^2-4}{a^2-6a+9}$. $\left[\frac{3x}{4y}; \frac{(a-2)(a-3)}{3(a+2)(a+3)}\right]$

222. $\frac{x^2+xy}{x^2+y^2} : \frac{x^3y+2x^2y^2+xy^3}{x^4-y^4}$; $\frac{x^2-3x+2}{x^2-6x+9} : \frac{x^2-2x+1}{x^2-5x+6}$. $\left[\frac{x-y}{y}; \frac{(x-2)^2}{(x-1)(x-3)}\right]$

223. $\frac{a^3-b^3}{a^2b^2-a^4} : \frac{a^2+ab+b^2}{ab^2+b^3}$; $\left(\frac{a^4+8a}{2a+4}\right)^3 : \left(\frac{a^4-2a^3+4a^2}{a^2+2a}\right)^3$. $\left[\frac{-b^2}{a^2}; \frac{(a+2)^3}{8}\right]$

224. $\frac{a^3-9a}{a^2-3a-10} : \frac{a^2+6a+9}{a-5}$; $\frac{z^3-x^3}{6z^3x^3} : \left(\frac{z^2+zx+y^2}{4z^2x^2} \cdot \frac{z^2-x^2}{3z+3x}\right)$. $\left[\frac{a(a-3)}{(a-2)(a+3)}; \frac{2}{zx}\right]$

225. $\frac{a^2+ab+b^2}{a^3+b^3} : \frac{a^3-b^3}{a^2-ab+b^2}$; $\frac{y^2+(a+c)y+ac}{y^2+(b+c)y+bc} : \frac{y^2-a^2}{y^2-b^2}$ $\left[\frac{1}{a^2-b^2}; \frac{y-b}{y-a}\right]$

226. $\frac{(a+b)\cdot(a^2-ab+b^2)+3ab(a+b)}{a^3+b^3} : \frac{(a+b)^2}{a^2-ab+b^2}$ [1]

227. $\frac{a^2+b^2+2ab-c^2}{c^2-a^2-b^2+2ab} : \frac{a+b+c}{b+c-a}$; $\frac{3a+3b}{4x-4} : \frac{bx+ax-b-a}{x^2-1}$ $\left[\frac{a+b-c}{a-b+c}; \frac{3(x+1)}{4(x-1)}\right]$

228. $\left(\frac{a^4+a^2b^2+b^4}{x^2+y^2} : \frac{a^6-b^6}{x^4-y^4}\right) \cdot \left(\frac{a+b}{x+y} : \frac{x-y}{a-b}\right)$. [1]

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

230. $2a^p : 4a^2$; $3a^{2p}b^{p+1} : (-2a^pb)$. $\left[\frac{1}{2}a^{p-2}; -\frac{3}{2}a^pb^p\right]$

231. $-\frac{3}{7}x^{-5}y^{2q} : \left(-\frac{1}{14}x^{-p}y^{q+1}\right)$. $[6x^{p-5}y^{q-1}]$

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. $\left(\frac{x+y}{x-y}-1\right):\left(1-\frac{x-y}{x+y}\right);\qquad \left(\frac{a^2-a}{a-3}:\frac{a^3-a}{5a-15}\right):\left(\frac{1}{a-1}-\frac{1}{a+1}\right).$ $\left[\frac{x+y}{x-y};\ \frac{5(a-1)}{2}\right]$

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]

Esercizi di riepilogo

Semplificare le seguenti **espressioni.**

286. $\left(\frac{x}{x+1}-\frac{x}{x-1}\right)\frac{1}{2x+2}-\frac{5}{x^2-1}$. $\left[\frac{6x+5}{(x+1)^2(1-x)}\right]$

287. $\left(\frac{5}{a+b}-\frac{3}{a}\right)\left(\frac{7}{b}-\frac{1}{a-b}\right)+\frac{24}{ab}+\frac{37}{a^2-b^2}$. $\left[\frac{38a}{b(a^2-b^2)}\right]$

288. $a\left(\frac{a-b}{a+b}-\frac{a+b}{a-b}\right)+b\left(\frac{a+b}{a-b}-\frac{a-b}{a+b}\right)$. $\left[-\frac{4ab}{a+b}\right]$

289. $\left[a\left(\frac{a-b}{a+b}-\frac{a+b}{a-b}\right)\right]:\left[b\left(\frac{a+b}{a-b}-\frac{a-b}{a+b}\right)\right]$. $\left[-\frac{a}{b}\right]$

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

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

292. $\left(x-y+\frac{xy}{x+y}\right)\left(x+y-\frac{xy}{x-y}\right)\frac{xy+y^2}{(x^2+y^2)^2-5x^2y^2}$. $\left[\frac{y}{x-y}\right]$

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

294. $\frac{x^2+ax+a^2}{x^2-a^2}\cdot\frac{\left(1-\frac{a}{x}\right)^2\cdot\left(1+\frac{a}{x}\right)^2}{x^3-a^3}$. $\left[\frac{x+a}{x^4}\right]$

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

296. $\left(\frac{5}{a-1}+\frac{5}{a-1}-\frac{10a^2}{1-a^2}\right):\left(\frac{a}{a-1}+\frac{1-a}{a+1}-1\right)$. $\left[\frac{10(1+a)}{3-a}\right]$

297. $\left[\left(1+\frac{1}{a}+\frac{1}{a^2}\right):\left(1-\frac{1}{a^3}\right)\right]:\left(\frac{2}{a-1}-\frac{4}{a-2}\right)+\frac{(a-1)^2-1}{2a}$. $[0]$

298. $\left(\frac{ab-ay+bx-xy}{a-x}+\frac{bx+by-xy-y^2}{x-a}\right):\frac{ax-xy}{ab-ay-bx+xy}$. $\left[\frac{(b-y)^2}{x}\right]$

299. $\left(\frac{x+1}{x-1}+\frac{x-1}{x+1}+\frac{4x}{1-x^2}\right)\left(1+\frac{2x}{1-x}\right)$. $[-2]$

300. $\left(\frac{3x+1}{x+y}\cdot\frac{x^2-y^2}{9x^2-1}+\frac{3x-1}{x-y}\frac{x^2-y^2}{9x^2-1}\right):\frac{3x^2-y}{3x+1}+\frac{2}{3x+1}$. $\left[\frac{12x}{9x^2-1}\right]$

301. $\left[\left(a+1+\frac{1}{a-1}\right):\left(a-1+\frac{1}{a+1}\right)-\frac{a-1}{a+1}\right]:\left(\frac{1}{a+1}+\frac{1}{a-1}\right)$. $[2]$

302. $\frac{5}{4}\left(\frac{5a^2+3a-2}{25a-10}+\frac{a^2}{2-5a}\right)\left(\frac{1}{3a-2}-\frac{1}{3a+2}\right):\frac{1}{5a^2-2a}$. $\left[\frac{a}{3a+2}\right]$