

Esercizi su: Fattorizzazione di polinomi

1. Scomponi le seguenti differenze di quadrati.

(a) $x^2 - 9 =$	$[(x - 3)(x + 3)]$
(b) $x^2 - 9 =$	$[(x - 3)(x + 3)]$
(c) $x^2 - 1 =$	$[(x - 1)(x + 1)]$
(d) $x^2 - 81 =$	$[(x - 9)(x + 9)]$
(e) $x^2 - 49 =$	$[(x - 7)(x + 7)]$
(f) $x^2 - 144 =$	$[(x - 12)(x + 12)]$
(g) $4x^2 - 100 =$	$[4(x - 5)(x + 5)]$
(h) $4x^2 - 81 =$	$[(2x - 9)(2x + 9)]$
(i) $25x^2 - 25 =$	$[25(x - 1)(x + 1)]$
(j) $64x^2 - 64 =$	$[64(x - 1)(x + 1)]$
(k) $49x^2 - 49 =$	$[49(x - 1)(x + 1)]$
(l) $49x^2 - 49 =$	$[49(x - 1)(x + 1)]$
(m) $9x^2 - 64 =$	$[(3x - 8)(3x + 8)]$
(n) $64x^2 - 25 =$	$[(8x - 5)(8x + 5)]$
(o) $49x^2 - 36 =$	$[(7x - 6)(7x + 6)]$
(p) $49x^2 - 81 =$	$[(7x - 9)(7x + 9)]$
(q) $16x^2 - 4 =$	$[4(2x - 1)(2x + 1)]$
(r) $144x^2 - 9 =$	$[9(4x - 1)(4x + 1)]$
(s) $100x^2 - 9 =$	$[(10x - 3)(10x + 3)]$
(t) $64x^2 - 121 =$	$[(8x - 11)(8x + 11)]$
(u) $25x^2 - 144 =$	$[(5x - 12)(5x + 12)]$
(v) $64x^2 - 121 =$	$[(8x - 11)(8x + 11)]$
(w) $64x^2 - 144 =$	$[16(2x - 3)(2x + 3)]$
(x) $144x^2 - 16 =$	$[16(3x - 1)(3x + 1)]$
(y) $144x^2 - 64 =$	$[16(3x - 2)(3x + 2)]$
(z) $144x^2 - 64 =$	$[16(3x - 2)(3x + 2)]$

2. Scomponi le seguenti differenze di quadrati.

(a) $x^2 - 81 =$	$[(x - 9)(x + 9)]$
(b) $16x^2 - 64 =$	$[16(x - 2)(x + 2)]$
(c) $\frac{x^2}{4} - 1 =$	$[\frac{(x-2)(x+2)}{4}]$
(d) $\frac{x^2}{4} - 1 =$	$[\frac{(x-2)(x+2)}{4}]$
(e) $\frac{x^2}{4} - 4 =$	$[\frac{(x-4)(x+4)}{4}]$
(f) $4x^2 - \frac{1}{9} =$	$[\frac{(6x-1)(6x+1)}{9}]$
(g) $x^2 - \frac{81}{16} =$	$[\frac{(4x-9)(4x+9)}{16}]$
(h) $9x^2 - \frac{16}{9} =$	$[\frac{(9x-4)(9x+4)}{9}]$
(i) $\frac{9x^2}{49} - 1 =$	$[\frac{(3x-7)(3x+7)}{49}]$

(j) $\frac{49x^2}{64} - 1 =$	$[\frac{(7x-8)(7x+8)}{64}]$
(k) $\frac{49x^2}{4} - 36 =$	$[\frac{(7x-12)(7x+12)}{4}]$
(l) $x^2 - \frac{144}{49} =$	$[\frac{(7x-12)(7x+12)}{49}]$
(m) $16x^2 - \frac{1}{49} =$	$[\frac{(28x-1)(28x+1)}{49}]$
(n) $\frac{25x^2}{49} - 4 =$	$[\frac{(5x-14)(5x+14)}{49}]$
(o) $81x^2 - \frac{25}{16} =$	$[\frac{(36x-5)(36x+5)}{16}]$
(p) $\frac{81x^2}{64} - 121 =$	$[\frac{(9x-88)(9x+88)}{64}]$
(q) $36x^2 - \frac{9}{100} =$	$[\frac{9(20x-1)(20x+1)}{100}]$
(r) $\frac{9x^2}{4} - \frac{81}{4} =$	$[\frac{9(x-3)(x+3)}{4}]$
(s) $\frac{x^2}{4} - \frac{4}{49} =$	$[\frac{(7x-4)(7x+4)}{196}]$
(t) $\frac{4x^2}{25} - \frac{1}{4} =$	$[\frac{(4x-5)(4x+5)}{100}]$
(u) $\frac{25x^2}{64} - \frac{9}{4} =$	$[\frac{(5x-12)(5x+12)}{64}]$
(v) $\frac{4x^2}{9} - \frac{36}{25} =$	$[\frac{4(5x-9)(5x+9)}{225}]$
(w) $\frac{9x^2}{100} - \frac{4}{9} =$	$[\frac{(9x-20)(9x+20)}{900}]$
(x) $\frac{9x^2}{16} - \frac{16}{25} =$	$[\frac{(15x-16)(15x+16)}{400}]$
(y) $\frac{144x^2}{121} - \frac{36}{121} =$	$[\frac{36(2x-1)(2x+1)}{121}]$
(z) $\frac{64x^2}{121} - \frac{144}{25} =$	$[\frac{16(10x-33)(10x+33)}{3025}]$

3. Trasforma i seguenti trinomi in quadrati di binomi.

(a) $x^2 - 14x + 49 =$	$[(x - 7)^2]$
(b) $4x^2 - 36x + 81 =$	$[(2x - 9)^2]$
(c) $4x^2 - 16x + 16 =$	$[4(x - 2)^2]$
(d) $49x^2 - 42x + 9 =$	$[(7x - 3)^2]$
(e) $49x^2 - 42x + 9 =$	$[(7x - 3)^2]$
(f) $4x^2 + 36x + 81 =$	$[(2x + 9)^2]$
(g) $49x^2 + 14x + 1 =$	$[(7x + 1)^2]$
(h) $25x^2 - 80x + 64 =$	$[(5x - 8)^2]$
(i) $9x^2 - 72x + 144 =$	$[9(x - 4)^2]$
(j) $81x^2 - 90x + 25 =$	$[(9x - 5)^2]$
(k) $25x^2 - 40x + 16 =$	$[(5x - 4)^2]$
(l) $36x^2 + 72x + 36 =$	$[36(x + 1)^2]$
(m) $16x^2 - 64x + 64 =$	$[16(x - 2)^2]$
(n) $16x^2 - 48x + 36 =$	$[4(2x - 3)^2]$
(o) $36x^2 + 48x + 16 =$	$[4(3x + 2)^2]$
(p) $16x^2 - 88x + 121 =$	$[(4x - 11)^2]$
(q) $81x^2 + 162x + 81 =$	$[81(x + 1)^2]$
(r) $16x^2 - 88x + 121 =$	$[(4x - 11)^2]$
(s) $100x^2 + 180x + 81 =$	$[(10x + 9)^2]$

(t) $121x^2 - 132x + 36 =$	$[(11x - 6)^2]$
(u) $64x^2 + 176x + 121 =$	$[(8x + 11)^2]$
(v) $100x^2 + 180x + 81 =$	$[(10x + 9)^2]$
(w) $81x^2 + 216x + 144 =$	$[9(3x + 4)^2]$
(x) $64x^2 - 192x + 144 =$	$[16(2x - 3)^2]$
(y) $144x^2 + 144x + 36 =$	$[36(2x + 1)^2]$
(z) $144x^2 - 144x + 36 =$	$[36(2x - 1)^2]$

4. Trasforma i seguenti trinomi in quadrati di binomi.

(a) $x^2 + 18x + 81 =$	$[(x + 9)^2]$
(b) $9x^2 - 9x + \frac{9}{4} =$	$[\frac{9(2x-1)^2}{4}]$
(c) $36x^2 - 8x + \frac{4}{9} =$	$[\frac{4(9x-1)^2}{9}]$
(d) $100x^2 - 12x + \frac{9}{25} =$	$[\frac{(50x-3)^2}{25}]$
(e) $\frac{x^2}{9} - \frac{2x}{3} + 1 =$	$[\frac{(x-3)^2}{9}]$
(f) $144x^2 - 32x + \frac{16}{9} =$	$[\frac{16(9x-1)^2}{9}]$
(g) $x^2 + \frac{2x}{3} + \frac{1}{9} =$	$[\frac{(3x+1)^2}{9}]$
(h) $\frac{4x^2}{9} - \frac{4x}{3} + 1 =$	$[\frac{(2x-3)^2}{9}]$
(i) $\frac{81x^2}{100} + 18x + 100 =$	$[\frac{(9x+100)^2}{100}]$
(j) $\frac{25x^2}{9} - \frac{50x}{3} + 25 =$	$[\frac{25(x-3)^2}{9}]$
(k) $\frac{49x^2}{81} - \frac{28x}{9} + 4 =$	$[\frac{(7x-18)^2}{81}]$
(l) $16x^2 + \frac{72x}{5} + \frac{81}{25} =$	$[\frac{(20x+9)^2}{25}]$
(m) $64x^2 - \frac{40x}{3} + \frac{25}{36} =$	$[\frac{(48x-5)^2}{36}]$
(n) $\frac{x^2}{4} - \frac{x}{5} + \frac{1}{25} =$	$[\frac{(5x-2)^2}{100}]$
(o) $\frac{4x^2}{9} - \frac{2x}{3} + \frac{1}{4} =$	$[\frac{(4x-3)^2}{36}]$
(p) $\frac{x^2}{16} + \frac{11x}{8} + \frac{121}{16} =$	$[\frac{(x+11)^2}{16}]$
(q) $\frac{9x^2}{16} - \frac{9x}{8} + \frac{9}{16} =$	$[\frac{9(x-1)^2}{16}]$
(r) $\frac{16x^2}{81} + \frac{8x}{27} + \frac{1}{9} =$	$[\frac{(4x+3)^2}{81}]$
(s) $\frac{81x^2}{4} - \frac{9x}{8} + \frac{1}{64} =$	$[\frac{(36x-1)^2}{64}]$
(t) $\frac{9x^2}{4} + \frac{8x}{3} + \frac{64}{81} =$	$[\frac{(27x+16)^2}{324}]$
(u) $\frac{9x^2}{4} + \frac{7x}{3} + \frac{49}{81} =$	$[\frac{(27x+14)^2}{324}]$
(v) $\frac{9x^2}{25} - \frac{3x}{25} + \frac{1}{100} =$	$[\frac{(6x-1)^2}{100}]$
(w) $\frac{9x^2}{49} - \frac{9x}{14} + \frac{9}{16} =$	$[\frac{9(4x-7)^2}{784}]$
(x) $\frac{9x^2}{100} - \frac{x}{20} + \frac{1}{144} =$	$[\frac{(18x-5)^2}{3600}]$
(y) $\frac{121x^2}{16} + \frac{33x}{10} + \frac{9}{25} =$	$[\frac{(55x+12)^2}{400}]$
(z) $\frac{121x^2}{144} + \frac{121x}{18} + \frac{121}{9} =$	$[\frac{121(x+4)^2}{144}]$

5. Scomponi i seguenti quadrati di trinomi.

(a) $x^4 + 8x^3 + 24x^2 + 32x + 16 =$	$[(x+2)^4]$
(b) $9x^4 - 36x^3 + 54x^2 - 36x + 9 =$	$[9(x-1)^4]$
(c) $x^4 + 2x^3 + 9x^2 + 8x + 16 =$	$[(x^2 + x + 4)^2]$
(d) $x^4 + 2x^3 + 11x^2 + 10x + 25 =$	$[(x^2 + x + 5)^2]$
(e) $4x^4 + 4x^3 + 25x^2 + 12x + 36 =$	$[(2x^2 + x + 6)^2]$
(f) $36x^4 + 12x^3 + 37x^2 + 6x + 9 =$	$[(6x^2 + x + 3)^2]$
(g) $9x^4 - 18x^3 + 27x^2 - 18x + 9 =$	$[9(x^2 - x + 1)^2]$
(h) $16x^4 + 8x^3 + 41x^2 + 10x + 25 =$	$[(4x^2 + x + 5)^2]$
(i) $4x^4 - 20x^3 + 9x^2 + 40x + 16 =$	$[(2x^2 - 5x - 4)^2]$
(j) $16x^4 - 16x^3 + 20x^2 - 8x + 4 =$	$[4(2x^2 - x + 1)^2]$
(k) $4x^4 + 16x^3 - 4x^2 - 40x + 25 =$	$[(2x^2 + 4x - 5)^2]$
(l) $36x^4 - 12x^3 + 61x^2 - 10x + 25 =$	$[(6x^2 - x + 5)^2]$
(m) $4x^4 + 24x^3 + 32x^2 - 12x + 1 =$	$[(2x^2 + 6x - 1)^2]$
(n) $9x^4 - 18x^3 + 33x^2 - 24x + 16 =$	$[(3x^2 - 3x + 4)^2]$
(o) $25x^4 - 40x^3 + 46x^2 - 24x + 9 =$	$[(5x^2 - 4x + 3)^2]$
(p) $9x^4 + 12x^3 - 32x^2 - 24x + 36 =$	$[(3x^2 + 2x - 6)^2]$
(q) $36x^4 + 36x^3 - 15x^2 - 12x + 4 =$	$[(6x^2 + 3x - 2)^2]$
(r) $25x^4 + 40x^3 - 24x^2 - 32x + 16 =$	$[(5x^2 + 4x - 4)^2]$
(s) $36x^4 - 24x^3 - 68x^2 + 24x + 36 =$	$[4(3x^2 - x - 3)^2]$
(t) $25x^4 + 40x^3 - 34x^2 - 40x + 25 =$	$[(5x^2 + 4x - 5)^2]$
(u) $4x^4 - 4x^3 - 3x^2 + 2x + 1 =$	$[(x-1)^2(2x+1)^2]$
(v) $4x^4 - 12x^3 + x^2 + 12x + 4 =$	$[(x-2)^2(2x+1)^2]$
(w) $4x^4 - 4x^3 - 11x^2 + 6x + 9 =$	$[(x+1)^2(2x-3)^2]$
(x) $4x^4 + 12x^3 + 13x^2 + 6x + 1 =$	$[(x+1)^2(2x+1)^2]$
(y) $9x^4 - 24x^3 - 8x^2 + 32x + 16 =$	$[(x-2)^2(3x+2)^2]$
(z) $16x^4 + 16x^3 - 44x^2 - 24x + 36 =$	$[4(x-1)^2(2x+3)^2]$

6. Scomponi i seguenti quadrati di trinomi.

(a) $x^4 - 6x^3 + 7x^2 + 6x + 1 =$	$[(x^2 - 3x - 1)^2]$
(b) $x^4 - x^3 + \frac{49x^2}{4} - 6x + 36 =$	$[\frac{(2x^2 - x + 12)^2}{4}]$
(c) $\frac{x^4}{4} - 2x^3 + 7x^2 - 12x + 9 =$	$[\frac{(x^2 - 4x + 6)^2}{4}]$
(d) $16x^4 + 2x^3 - \frac{255x^2}{16} - x + 4 =$	$[\frac{(16x^2 + x - 8)^2}{16}]$
(e) $36x^4 - 30x^3 - \frac{71x^2}{4} + 10x + 4 =$	$[\frac{(12x^2 - 5x - 4)^2}{4}]$
(f) $\frac{4x^4}{25} + 4x^3 + \frac{149x^2}{5} + 60x + 36 =$	$[\frac{(2x^2 + 25x + 30)^2}{25}]$
(g) $4x^4 - \frac{4x^3}{3} - \frac{71x^2}{9} + \frac{4x}{3} + 4 =$	$[\frac{(6x^2 - x - 6)^2}{9}]$
(h) $x^4 + \frac{4x^3}{5} + \frac{54x^2}{25} + \frac{4x}{5} + 1 =$	$[\frac{(5x^2 + 2x + 5)^2}{25}]$

(i)	$x^4 - 3x^3 + \frac{19x^2}{4} - \frac{15x}{4} + \frac{25}{16} =$	$[\frac{(4x^2-6x+5)^2}{16}]$
(j)	$25x^4 - 20x^3 + \frac{2x^2}{3} + \frac{4x}{3} + \frac{1}{9} =$	$[\frac{(15x^2-6x-1)^2}{9}]$
(k)	$\frac{9x^4}{16} - x^3 - \frac{65x^2}{36} + 2x + \frac{9}{4} =$	$[\frac{(9x^2-8x-18)^2}{144}]$
(l)	$x^4 - 4x^3 + \frac{28x^2}{5} - \frac{16x}{5} + \frac{16}{25} =$	$[\frac{(5x^2-10x+4)^2}{25}]$
(m)	$\frac{x^4}{9} - 4x^3 + \frac{319x^2}{9} + 10x + \frac{25}{36} =$	$[\frac{(2x^2-36x-5)^2}{36}]$
(n)	$\frac{x^4}{36} + \frac{x^3}{4} + \frac{43x^2}{48} + \frac{3x}{2} + 1 =$	$[\frac{(2x^2+9x+12)^2}{144}]$
(o)	$\frac{4x^4}{9} + \frac{8x^3}{9} + \frac{13x^2}{9} + x + \frac{9}{16} =$	$[\frac{(8x^2+8x+9)^2}{144}]$
(p)	$\frac{x^4}{4} - \frac{3x^3}{2} + \frac{47x^2}{12} - 5x + \frac{25}{9} =$	$[\frac{(3x^2-9x+10)^2}{36}]$
(q)	$\frac{9x^4}{25} + \frac{2x^3}{5} - \frac{49x^2}{45} - \frac{2x}{3} + 1 =$	$[\frac{(9x^2+5x-15)^2}{225}]$
(r)	$16x^4 + \frac{8x^3}{3} + \frac{61x^2}{9} + \frac{5x}{9} + \frac{25}{36} =$	$[\frac{(24x^2+2x+5)^2}{36}]$
(s)	$\frac{4x^4}{9} + \frac{4x^3}{9} + \frac{5x^2}{9} + \frac{2x}{9} + \frac{1}{9} =$	$[\frac{(2x^2+x+1)^2}{9}]$
(t)	$36x^4 - 2x^3 - \frac{143x^2}{36} + \frac{x}{9} + \frac{1}{9} =$	$[\frac{(4x-1)^2(9x+2)^2}{36}]$
(u)	$\frac{4x^4}{9} - \frac{8x^3}{5} + \frac{308x^2}{75} - \frac{24x}{5} + 4 =$	$[\frac{4(5x^2-9x+15)^2}{225}]$
(v)	$\frac{25x^4}{4} + 4x^3 - \frac{202x^2}{75} - \frac{16x}{15} + \frac{4}{9} =$	$[\frac{(75x^2+24x-20)^2}{900}]$
(w)	$\frac{16x^4}{9} + \frac{4x^3}{3} + \frac{19x^2}{12} + \frac{x}{2} + \frac{1}{4} =$	$[\frac{(8x^2+3x+3)^2}{36}]$
(x)	$\frac{x^4}{4} + \frac{x^3}{4} - \frac{77x^2}{48} - \frac{5x}{6} + \frac{25}{9} =$	$[\frac{(6x^2+3x-20)^2}{144}]$
(y)	$\frac{9x^4}{25} + \frac{x^3}{5} + \frac{73x^2}{36} + \frac{5x}{9} + \frac{25}{9} =$	$[\frac{(18x^2+5x+50)^2}{900}]$
(z)	$\frac{4x^4}{25} - \frac{8x^3}{5} + \frac{96x^2}{25} + \frac{4x}{5} + \frac{1}{25} =$	$[\frac{(2x^2-10x-1)^2}{25}]$

7. Scomponi i seguenti trinomi notevoli.

(a)	$x^2 + 8x + 16 =$	$[(x + 4)^2]$
(b)	$x^2 + 12x + 36 =$	$[(x + 6)^2]$
(c)	$x^2 + 12x + 36 =$	$[(x + 6)^2]$
(d)	$x^2 + 14x + 49 =$	$[(x + 7)^2]$
(e)	$x^2 - 49 =$	$[(x - 7)(x + 7)]$
(f)	$x^2 - 5x + 4 =$	$[(x - 4)(x - 1)]$
(g)	$x^2 - 2x - 3 =$	$[(x - 3)(x + 1)]$
(h)	$x^2 + 2x - 24 =$	$[(x - 4)(x + 6)]$
(i)	$x^2 - 5x - 36 =$	$[(x - 9)(x + 4)]$
(j)	$x^2 - 6x - 27 =$	$[(x - 9)(x + 3)]$
(k)	$x^2 - 4x - 45 =$	$[(x - 9)(x + 5)]$
(l)	$x^2 - 10x + 9 =$	$[(x - 9)(x - 1)]$
(m)	$x^2 - 3x - 10 =$	$[(x - 5)(x + 2)]$
(n)	$x^2 - 2x - 24 =$	$[(x - 6)(x + 4)]$
(o)	$x^2 + 3x - 10 =$	$[(x - 2)(x + 5)]$

(p) $x^2 - 7x - 44 =$	$[(x - 11)(x + 4)]$
(q) $x^2 - 6x - 55 =$	$[(x - 11)(x + 5)]$
(r) $x^2 - 8x - 33 =$	$[(x - 11)(x + 3)]$
(s) $x^2 + 6x - 40 =$	$[(x - 4)(x + 10)]$
(t) $x^2 + 14x + 45 =$	$[(x + 5)(x + 9)]$
(u) $x^2 + 3x - 70 =$	$[(x - 7)(x + 10)]$
(v) $x^2 + 7x - 44 =$	$[(x - 4)(x + 11)]$
(w) $x^2 - 2x - 99 =$	$[(x - 11)(x + 9)]$
(x) $x^2 - 20x + 99 =$	$[(x - 11)(x - 9)]$
(y) $x^2 - 15x + 36 =$	$[(x - 12)(x - 3)]$
(z) $x^2 + 13x + 22 =$	$[(x + 2)(x + 11)]$

8. Scomponi i seguenti trinomi notevoli.

(a) $x^2 + 3x + 2 =$	$[(x + 1)(x + 2)]$
(b) $x^2 - 2x + \frac{5}{9} =$	$[\frac{(3x-5)(3x-1)}{9}]$
(c) $x^2 + 2x + \frac{3}{4} =$	$[\frac{(2x+1)(2x+3)}{4}]$
(d) $x^2 - \frac{x}{4} - \frac{3}{4} =$	$[\frac{(x-1)(4x+3)}{4}]$
(e) $x^2 - \frac{8x}{5} + \frac{3}{5} =$	$[\frac{(x-1)(5x-3)}{5}]$
(f) $x^2 + \frac{7x}{6} + \frac{1}{6} =$	$[\frac{(x+1)(6x+1)}{6}]$
(g) $x^2 + \frac{17x}{6} + \frac{5}{3} =$	$[\frac{(x+2)(6x+5)}{6}]$
(h) $x^2 - \frac{13x}{6} + \frac{7}{6} =$	$[\frac{(x-1)(6x-7)}{6}]$
(i) $x^2 - \frac{14x}{3} + \frac{8}{3} =$	$[\frac{(x-4)(3x-2)}{3}]$
(j) $x^2 - \frac{45x}{7} + \frac{18}{7} =$	$[\frac{(x-6)(7x-3)}{7}]$
(k) $x^2 - \frac{5x}{4} - \frac{3}{8} =$	$[\frac{(2x-3)(4x+1)}{8}]$
(l) $x^2 + \frac{22x}{5} + \frac{21}{5} =$	$[\frac{(x+3)(5x+7)}{5}]$
(m) $x^2 + \frac{11x}{9} - \frac{14}{9} =$	$[\frac{(x+2)(9x-7)}{9}]$
(n) $x^2 - \frac{11x}{10} - \frac{9}{5} =$	$[\frac{(x-2)(10x+9)}{10}]$
(o) $x^2 - \frac{3x}{8} - \frac{7}{16} =$	$[\frac{(2x+1)(8x-7)}{16}]$
(p) $x^2 - \frac{49x}{10} + \frac{9}{5} =$	$[\frac{(2x-9)(5x-2)}{10}]$
(q) $x^2 + \frac{41x}{15} + \frac{4}{5} =$	$[\frac{(3x+1)(5x+12)}{15}]$
(r) $x^2 + \frac{17x}{12} + \frac{1}{9} =$	$[\frac{(3x+4)(12x+1)}{36}]$
(s) $x^2 + \frac{23x}{45} + \frac{2}{45} =$	$[\frac{(5x+2)(9x+1)}{45}]$
(t) $x^2 - \frac{17x}{21} - \frac{10}{7} =$	$[\frac{(3x-5)(7x+6)}{21}]$
(u) $x^2 + \frac{13x}{18} + \frac{5}{54} =$	$[\frac{(6x+1)(9x+5)}{54}]$
(v) $x^2 - \frac{5x}{3} + \frac{11}{16} =$	$[\frac{(4x-3)(12x-11)}{48}]$
(w) $x^2 + \frac{13x}{5} + \frac{33}{20} =$	$[\frac{(2x+3)(10x+11)}{20}]$
(x) $x^2 - \frac{x}{11} - \frac{56}{121} =$	$[\frac{(11x-8)(11x+7)}{121}]$
(y) $x^2 - \frac{51x}{20} - \frac{11}{20} =$	$[\frac{(4x-11)(5x+1)}{20}]$

$$(z) x^2 + \frac{75x}{28} + \frac{25}{14} =$$

$$\left[\frac{(4x+5)(7x+10)}{28} \right]$$

9. Scomponi i seguenti cubi di binomi.

(a) $x^3 + 15x^2 + 75x + 125 =$	$[(x + 5)^3]$
(b) $x^3 - 18x^2 + 108x - 216 =$	$[(x - 6)^3]$
(c) $8x^3 + 24x^2 + 24x + 8 =$	$[8(x + 1)^3]$
(d) $64x^3 + 48x^2 + 12x + 1 =$	$[(4x + 1)^3]$
(e) $27x^3 + 54x^2 + 36x + 8 =$	$[(3x + 2)^3]$
(f) $27x^3 - 54x^2 + 36x - 8 =$	$[(3x - 2)^3]$
(g) $-x^3 - 15x^2 - 75x - 125 =$	$[-(x + 5)^3]$
(h) $64x^3 + 96x^2 + 48x + 8 =$	$[8(2x + 1)^3]$
(i) $8x^3 - 60x^2 + 150x - 125 =$	$[(2x - 5)^3]$
(j) $-8x^3 + 12x^2 - 6x + 1 =$	$[-(2x - 1)^3]$
(k) $-27x^3 + 27x^2 - 9x + 1 =$	$[-(3x - 1)^3]$
(l) $-27x^3 - 27x^2 - 9x - 1 =$	$[-(3x + 1)^3]$
(m) $216x^3 - 216x^2 + 72x - 8 =$	$[8(3x - 1)^3]$
(n) $-125x^3 + 75x^2 - 15x + 1 =$	$[-(5x - 1)^3]$
(o) $-125x^3 + 75x^2 - 15x + 1 =$	$[-(5x - 1)^3]$
(p) $216x^3 - 540x^2 + 450x - 125 =$	$[(6x - 5)^3]$
(q) $-8x^3 + 72x^2 - 216x + 216 =$	$[-8(x - 3)^3]$
(r) $-8x^3 + 60x^2 - 150x + 125 =$	$[-(2x - 5)^3]$
(s) $-8x^3 - 72x^2 - 216x - 216 =$	$[-8(x + 3)^3]$
(t) $216x^3 + 432x^2 + 288x + 64 =$	$[8(3x + 2)^3]$
(u) $-125x^3 + 150x^2 - 60x + 8 =$	$[-(5x - 2)^3]$
(v) $216x^3 - 324x^2 + 162x - 27 =$	$[27(2x - 1)^3]$
(w) $-125x^3 + 225x^2 - 135x + 27 =$	$[-(5x - 3)^3]$
(x) $-64x^3 + 192x^2 - 192x + 64 =$	$[-64(x - 1)^3]$
(y) $-216x^3 + 432x^2 - 288x + 64 =$	$[-8(3x - 2)^3]$
(z) $-216x^3 + 648x^2 - 648x + 216 =$	$[-216(x - 1)^3]$

10. Scomponi i seguenti cubi di binomi.

(a) $x^3 + 3x^2 + 3x + 1 =$	$[(x + 1)^3]$
(b) $x^3 + 12x^2 + 48x + 64 =$	$[(x + 4)^3]$
(c) $-x^3 - 3x^2 - 3x - 1 =$	$[-(x + 1)^3]$
(d) $64x^3 - 48x^2 + 12x - 1 =$	$[(4x - 1)^3]$
(e) $-8x^3 - 48x^2 - 96x - 64 =$	$[-8(x + 2)^3]$
(f) $216x^3 + 540x^2 + 450x + 125 =$	$[(6x + 5)^3]$
(g) $27x^3 + 45x^2 + 25x + \frac{125}{27} =$	$\left[\frac{(9x+5)^3}{27} \right]$
(h) $8x^3 - 8x^2 + \frac{8x}{3} - \frac{8}{27} =$	$\left[\frac{8(3x-1)^3}{27} \right]$
(i) $-\frac{27x^3}{8} - \frac{27x^2}{2} - 18x - 8 =$	$\left[-\frac{(3x+4)^3}{8} \right]$

(j)	$-8x^3 + 9x^2 - \frac{27x}{8} + \frac{27}{64} =$	$[-\frac{(8x-3)^3}{64}]$
(k)	$\frac{x^3}{125} + \frac{3x^2}{25} + \frac{3x}{5} + 1 =$	$[\frac{(x+5)^3}{125}]$
(l)	$\frac{27x^3}{8} + \frac{27x^2}{4} + \frac{9x}{2} + 1 =$	$[\frac{(3x+2)^3}{8}]$
(m)	$27x^3 - \frac{27x^2}{2} + \frac{9x}{4} - \frac{1}{8} =$	$[\frac{(6x-1)^3}{8}]$
(n)	$27x^3 + \frac{27x^2}{2} + \frac{9x}{4} + \frac{1}{8} =$	$[\frac{(6x+1)^3}{8}]$
(o)	$\frac{125x^3}{64} + \frac{75x^2}{16} + \frac{15x}{4} + 1 =$	$[\frac{(5x+4)^3}{64}]$
(p)	$125x^3 - \frac{225x^2}{2} + \frac{135x}{4} - \frac{27}{8} =$	$[\frac{(10x-3)^3}{8}]$
(q)	$-\frac{27x^3}{64} + \frac{27x^2}{16} - \frac{9x}{4} + 1 =$	$[-\frac{(3x-4)^3}{64}]$
(r)	$-\frac{x^3}{8} - \frac{3x^2}{8} - \frac{3x}{8} - \frac{1}{8} =$	$[-\frac{(x+1)^3}{8}]$
(s)	$-\frac{x^3}{8} - \frac{3x^2}{8} - \frac{3x}{8} - \frac{1}{8} =$	$[-\frac{(x+1)^3}{8}]$
(t)	$-\frac{x^3}{64} + \frac{3x^2}{32} - \frac{3x}{16} + \frac{1}{8} =$	$[-\frac{(x-2)^3}{64}]$
(u)	$-\frac{8x^3}{27} - \frac{4x^2}{9} - \frac{2x}{9} - \frac{1}{27} =$	$[-\frac{(2x+1)^3}{27}]$
(v)	$\frac{x^3}{64} + \frac{9x^2}{40} + \frac{27x}{25} + \frac{216}{125} =$	$[\frac{(5x+24)^3}{8000}]$
(w)	$-\frac{x^3}{216} + \frac{5x^2}{72} - \frac{25x}{72} + \frac{125}{216} =$	$[-\frac{(x-5)^3}{216}]$
(x)	$-\frac{x^3}{27} + \frac{2x^2}{5} - \frac{36x}{25} + \frac{216}{125} =$	$[-\frac{(5x-18)^3}{3375}]$
(y)	$-\frac{125x^3}{64} - \frac{15x^2}{8} - \frac{3x}{5} - \frac{8}{125} =$	$[-\frac{(25x+8)^3}{8000}]$
(z)	$-\frac{125x^3}{8} + \frac{45x^2}{2} - \frac{54x}{5} + \frac{216}{125} =$	$[-\frac{(25x-12)^3}{1000}]$

11. Scomponi le seguenti potenze di binomi.

(a)	$x^4 + 8x^3 + 24x^2 + 32x + 16 =$	$[(x+2)^4]$
(b)	$x^4 + 8x^3 + 24x^2 + 32x + 16 =$	$[(x+2)^4]$
(c)	$x^4 - 8x^3 + 24x^2 - 32x + 16 =$	$[(x-2)^4]$
(d)	$x^4 + 8x^3 + 24x^2 + 32x + 16 =$	$[(x+2)^4]$
(e)	$x^4 + 12x^3 + 54x^2 + 108x + 81 =$	$[(x+3)^4]$
(f)	$x^4 - 12x^3 + 54x^2 - 108x + 81 =$	$[(x-3)^4]$
(g)	$x^4 + 12x^3 + 54x^2 + 108x + 81 =$	$[(x+3)^4]$
(h)	$x^4 + 12x^3 + 54x^2 + 108x + 81 =$	$[(x+3)^4]$
(i)	$x^4 + 12x^3 + 54x^2 + 108x + 81 =$	$[(x+3)^4]$
(j)	$x^4 - 16x^3 + 96x^2 - 256x + 256 =$	$[(x-4)^4]$
(k)	$16x^4 + 32x^3 + 24x^2 + 8x + 1 =$	$[(2x+1)^4]$
(l)	$81x^4 - 108x^3 + 54x^2 - 12x + 1 =$	$[(3x-1)^4]$
(m)	$256x^4 - 256x^3 + 96x^2 - 16x + 1 =$	$[(4x-1)^4]$
(n)	$256x^4 + 256x^3 + 96x^2 + 16x + 1 =$	$[(4x+1)^4]$
(o)	$81x^4 - 216x^3 + 216x^2 - 96x + 16 =$	$[(3x-2)^4]$
(p)	$16x^4 - 96x^3 + 216x^2 - 216x + 81 =$	$[(2x-3)^4]$
(q)	$81x^4 + 216x^3 + 216x^2 + 96x + 16 =$	$[(3x+2)^4]$
(r)	$81x^4 + 432x^3 + 864x^2 + 768x + 256 =$	$[(3x+4)^4]$
(s)	$81x^4 - 432x^3 + 864x^2 - 768x + 256 =$	$[(3x-4)^4]$

(t) $16x^4 - 128x^3 + 384x^2 - 512x + 256 =$	$[16(x-2)^4]$
(u) $16x^4 + 128x^3 + 384x^2 + 512x + 256 =$	$[16(x+2)^4]$
(v) $16x^4 + 128x^3 + 384x^2 + 512x + 256 =$	$[16(x+2)^4]$
(w) $256x^4 - 512x^3 + 384x^2 - 128x + 16 =$	$[16(2x-1)^4]$
(x) $256x^4 - 512x^3 + 384x^2 - 128x + 16 =$	$[16(2x-1)^4]$
(y) $256x^4 - 1024x^3 + 1536x^2 - 1024x + 256 =$	$[256(x-1)^4]$
(z) $256x^4 + 1024x^3 + 1536x^2 + 1024x + 256 =$	$[256(x+1)^4]$

12. Scomponi le seguenti potenze di binomi.

(a) $x^4 + 4x^3 + 6x^2 + 4x + 1 =$	$[(x+1)^4]$
(b) $x^4 + 4x^3 + 6x^2 + 4x + 1 =$	$[(x+1)^4]$
(c) $x^4 - 8x^3 + 24x^2 - 32x + 16 =$	$[(x-2)^4]$
(d) $16x^4 + 32x^3 + 24x^2 + 8x + 1 =$	$[(2x+1)^4]$
(e) $81x^4 - 108x^3 + 54x^2 - 12x + 1 =$	$[(3x-1)^4]$
(f) $256x^4 - 256x^3 + 96x^2 - 16x + 1 =$	$[(4x-1)^4]$
(g) $16x^4 - 64x^3 + 96x^2 - 64x + 16 =$	$[16(x-1)^4]$
(h) $256x^4 - 256x^3 + 96x^2 - 16x + 1 =$	$[(4x-1)^4]$
(i) $256x^4 + 512x^3 + 384x^2 + 128x + 16 =$	$[16(2x+1)^4]$
(j) $\frac{x^4}{16} - \frac{x^3}{2} + \frac{3x^2}{2} - 2x + 1 =$	$[\frac{(x-2)^4}{16}]$
(k) $\frac{x^4}{16} + \frac{x^3}{2} + \frac{3x^2}{2} + 2x + 1 =$	$[\frac{(x+2)^4}{16}]$
(l) $x^4 + x^3 + \frac{3x^2}{8} + \frac{x}{16} + \frac{1}{256} =$	$[\frac{(4x+1)^4}{256}]$
(m) $\frac{x^4}{16} + \frac{3x^3}{2} + \frac{27x^2}{2} + 54x + 81 =$	$[\frac{(x+6)^4}{16}]$
(n) $\frac{81x^4}{256} + \frac{27x^3}{16} + \frac{27x^2}{8} + 3x + 1 =$	$[\frac{(3x+4)^4}{256}]$
(o) $\frac{x^4}{81} + \frac{4x^3}{27} + \frac{2x^2}{3} + \frac{4x}{3} + 1 =$	$[\frac{(x+3)^4}{81}]$
(p) $x^4 + \frac{8x^3}{3} + \frac{8x^2}{3} + \frac{32x}{27} + \frac{16}{81} =$	$[\frac{(3x+2)^4}{81}]$
(q) $\frac{16x^4}{81} + \frac{32x^3}{27} + \frac{8x^2}{3} + \frac{8x}{3} + 1 =$	$[\frac{(2x+3)^4}{81}]$
(r) $\frac{x^4}{16} - \frac{x^3}{4} + \frac{3x^2}{8} - \frac{x}{4} + \frac{1}{16} =$	$[\frac{(x-1)^4}{16}]$
(s) $x^4 + \frac{16x^3}{3} + \frac{32x^2}{3} + \frac{256x}{27} + \frac{256}{81} =$	$[\frac{(3x+4)^4}{81}]$
(t) $\frac{256x^4}{81} - \frac{256x^3}{27} + \frac{32x^2}{3} - \frac{16x}{3} + 1 =$	$[\frac{(4x-3)^4}{81}]$
(u) $\frac{x^4}{16} + \frac{3x^3}{4} + \frac{27x^2}{8} + \frac{27x}{4} + \frac{81}{16} =$	$[\frac{(x+3)^4}{16}]$
(v) $\frac{x^4}{256} - \frac{x^3}{64} + \frac{3x^2}{128} - \frac{x}{64} + \frac{1}{256} =$	$[\frac{(x-1)^4}{256}]$
(w) $\frac{x^4}{16} - \frac{3x^3}{4} + \frac{27x^2}{8} - \frac{27x}{4} + \frac{81}{16} =$	$[\frac{(x-3)^4}{16}]$
(x) $\frac{x^4}{256} - \frac{3x^3}{32} + \frac{27x^2}{32} - \frac{27x}{8} + \frac{81}{16} =$	$[\frac{(x-6)^4}{256}]$
(y) $256x^4 - \frac{1024x^3}{3} + \frac{512x^2}{3} - \frac{1024x}{27} + \frac{256}{81} =$	$[\frac{256(3x-1)^4}{81}]$
(z) $\frac{x^4}{256} + \frac{x^3}{12} + \frac{2x^2}{3} + \frac{64x}{27} + \frac{256}{81} =$	$[\frac{(3x+16)^4}{20736}]$

13. Scomponi le seguenti potenze di binomi.

(a) $x^5 - 5x^4 + 10x^3 - 10x^2 + 5x - 1 =$	$[(x-1)^5]$
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(b) $x^5 + 10x^4 + 40x^3 + 80x^2 + 80x + 32 =$	$[(x + 2)^5]$
(c) $-x^5 + 5x^4 - 10x^3 + 10x^2 - 5x + 1 =$	$[-(x - 1)^5]$
(d) $-x^5 - 5x^4 - 10x^3 - 10x^2 - 5x - 1 =$	$[-(x + 1)^5]$
(e) $-x^5 + 5x^4 - 10x^3 + 10x^2 - 5x + 1 =$	$[-(x - 1)^5]$
(f) $-x^5 - 5x^4 - 10x^3 - 10x^2 - 5x - 1 =$	$[-(x + 1)^5]$
(g) $x^5 - 15x^4 + 90x^3 - 270x^2 + 405x - 243 =$	$[(x - 3)^5]$
(h) $-x^5 + 10x^4 - 40x^3 + 80x^2 - 80x + 32 =$	$[-(x - 2)^5]$
(i) $-x^5 - 15x^4 - 90x^3 - 270x^2 - 405x - 243 =$	$[-(x + 3)^5]$
(j) $243x^5 - 405x^4 + 270x^3 - 90x^2 + 15x - 1 =$	$[(3x - 1)^5]$
(k) $-32x^5 + 80x^4 - 80x^3 + 40x^2 - 10x + 1 =$	$[-(2x - 1)^5]$
(l) $-32x^5 + 80x^4 - 80x^3 + 40x^2 - 10x + 1 =$	$[-(2x - 1)^5]$
(m) $32x^5 - 160x^4 + 320x^3 - 320x^2 + 160x - 32 =$	$[32(x - 1)^5]$
(n) $32x^5 - 160x^4 + 320x^3 - 320x^2 + 160x - 32 =$	$[32(x - 1)^5]$
(o) $-243x^5 - 405x^4 - 270x^3 - 90x^2 - 15x - 1 =$	$[-(3x + 1)^5]$
(p) $243x^5 - 810x^4 + 1080x^3 - 720x^2 + 240x - 32 =$	$[(3x - 2)^5]$
(q) $243x^5 + 810x^4 + 1080x^3 + 720x^2 + 240x + 32 =$	$[(3x + 2)^5]$
(r) $32x^5 - 240x^4 + 720x^3 - 1080x^2 + 810x - 243 =$	$[(2x - 3)^5]$
(s) $-32x^5 - 160x^4 - 320x^3 - 320x^2 - 160x - 32 =$	$[-32(x + 1)^5]$
(t) $-32x^5 + 160x^4 - 320x^3 + 320x^2 - 160x + 32 =$	$[-32(x - 1)^5]$
(u) $-243x^5 - 810x^4 - 1080x^3 - 720x^2 - 240x - 32 =$	$[-(3x + 2)^5]$
(v) $-243x^5 - 810x^4 - 1080x^3 - 720x^2 - 240x - 32 =$	$[-(3x + 2)^5]$
(w) $243x^5 + 1215x^4 + 2430x^3 + 2430x^2 + 1215x + 243 =$	$[243(x + 1)^5]$
(x) $243x^5 - 1215x^4 + 2430x^3 - 2430x^2 + 1215x - 243 =$	$[243(x - 1)^5]$
(y) $-243x^5 - 1215x^4 - 2430x^3 - 2430x^2 - 1215x - 243 =$	$[-243(x + 1)^5]$
(z) $-243x^5 - 1215x^4 - 2430x^3 - 2430x^2 - 1215x - 243 =$	$[-243(x + 1)^5]$

14. Scomponi le seguenti potenze di binomi.

(a) $x^5 - 5x^4 + 10x^3 - 10x^2 + 5x - 1 =$	$[(x - 1)^5]$
(b) $x^5 + 5x^4 + 10x^3 + 10x^2 + 5x + 1 =$	$[(x + 1)^5]$
(c) $x^5 + 5x^4 + 10x^3 + 10x^2 + 5x + 1 =$	$[(x + 1)^5]$
(d) $x^5 + 5x^4 + 10x^3 + 10x^2 + 5x + 1 =$	$[(x + 1)^5]$
(e) $x^5 + 5x^4 + 10x^3 + 10x^2 + 5x + 1 =$	$[(x + 1)^5]$
(f) $-x^5 - 5x^4 - 10x^3 - 10x^2 - 5x - 1 =$	$[-(x + 1)^5]$
(g) $-x^5 + 10x^4 - 40x^3 + 80x^2 - 80x + 32 =$	$[-(x - 2)^5]$
(h) $-x^5 - 15x^4 - 90x^3 - 270x^2 - 405x - 243 =$	$[-(x + 3)^5]$
(i) $-x^5 + 15x^4 - 90x^3 + 270x^2 - 405x + 243 =$	$[-(x - 3)^5]$
(j) $-32x^5 - 80x^4 - 80x^3 - 40x^2 - 10x - 1 =$	$[-(2x + 1)^5]$
(k) $-32x^5 + 80x^4 - 80x^3 + 40x^2 - 10x + 1 =$	$[-(2x - 1)^5]$
(l) $-243x^5 + 405x^4 - 270x^3 + 90x^2 - 15x + 1 =$	$[-(3x - 1)^5]$
(m) $-32x^5 + 240x^4 - 720x^3 + 1080x^2 - 810x + 243 =$	$[-(2x - 3)^5]$

(n)	$-243x^5 - 810x^4 - 1080x^3 - 720x^2 - 240x - 32 =$	$[-(3x+2)^5]$
(o)	$32x^5 - 120x^4 + 180x^3 - 135x^2 + \frac{405x}{8} - \frac{243}{32} =$	$[\frac{(4x-3)^5}{32}]$
(p)	$-32x^5 + 120x^4 - 180x^3 + 135x^2 - \frac{405x}{8} + \frac{243}{32} =$	$[-\frac{(4x-3)^5}{32}]$
(q)	$x^5 - \frac{5x^4}{3} + \frac{10x^3}{9} - \frac{10x^2}{27} + \frac{5x}{81} - \frac{1}{243} =$	$[\frac{(3x-1)^5}{243}]$
(r)	$-x^5 - \frac{5x^4}{3} - \frac{10x^3}{9} - \frac{10x^2}{27} - \frac{5x}{81} - \frac{1}{243} =$	$[-\frac{(3x+1)^5}{243}]$
(s)	$-\frac{x^5}{243} - \frac{10x^4}{81} - \frac{40x^3}{27} - \frac{80x^2}{9} - \frac{80x}{3} - 32 =$	$[-\frac{(x+6)^5}{243}]$
(t)	$\frac{32x^5}{243} + \frac{80x^4}{81} + \frac{80x^3}{27} + \frac{40x^2}{9} + \frac{10x}{3} + 1 =$	$[\frac{(2x+3)^5}{243}]$
(u)	$\frac{32x^5}{243} + \frac{80x^4}{81} + \frac{80x^3}{27} + \frac{40x^2}{9} + \frac{10x}{3} + 1 =$	$[\frac{(2x+3)^5}{243}]$
(v)	$-\frac{x^5}{32} + \frac{15x^4}{16} - \frac{45x^3}{4} + \frac{135x^2}{2} - \frac{405x}{2} + 243 =$	$[-\frac{(x-6)^5}{32}]$
(w)	$\frac{32x^5}{243} + \frac{80x^4}{81} + \frac{80x^3}{27} + \frac{40x^2}{9} + \frac{10x}{3} + 1 =$	$[\frac{(2x+3)^5}{243}]$
(x)	$-243x^5 + \frac{405x^4}{2} - \frac{135x^3}{2} + \frac{45x^2}{4} - \frac{15x}{16} + \frac{1}{32} =$	$[-\frac{(6x-1)^5}{32}]$
(y)	$-\frac{x^5}{243} - \frac{5x^4}{162} - \frac{5x^3}{54} - \frac{5x^2}{36} - \frac{5x}{48} - \frac{1}{32} =$	$[-\frac{(2x+3)^5}{7776}]$
(z)	$-\frac{x^5}{243} - \frac{5x^4}{162} - \frac{5x^3}{54} - \frac{5x^2}{36} - \frac{5x}{48} - \frac{1}{32} =$	$[-\frac{(2x+3)^5}{7776}]$

15. Scomponi i seguenti polinomi con il raccoglimento a fattore comune.

(a)	$-10x^8 + 10x^6 + 4x^5 =$	$[-2x^5(5x^3 - 5x - 2)]$
(b)	$-32x^5 + 28x^3 + 44x^2 =$	$[-4x^2(8x^3 - 7x - 11)]$
(c)	$-20x^5 + 50x^4 + 55x^2 - 45x =$	$[-5x(4x^4 - 10x^3 - 11x + 9)]$
(d)	$-24x^9 + 14x^8 - 4x^6 + 4x^5 =$	$[-2x^5(12x^4 - 7x^3 + 2x - 2)]$
(e)	$5x^5 + 30x^4 - 10x^3 - 25x^2 + 45x =$	$[5x(x^4 + 6x^3 - 2x^2 - 5x + 9)]$
(f)	$x^8 + 3x^7 + 7x^6 + 3x^5 - 7x^4 =$	$[x^4(x^4 + 3x^3 + 7x^2 + 3x - 7)]$
(g)	$6x^5 + 16x^4 + 14x^3 - 10x^2 + 2x =$	$[2x(3x^4 + 8x^3 + 7x^2 - 5x + 1)]$
(h)	$20x^5 - 25x^4 + 30x^3 - 30x^2 + 45x =$	$[5x(4x^4 - 5x^3 + 6x^2 - 6x + 9)]$
(i)	$-2x^5 + 12x^4 - 4x^3 + 20x^2 + 18x =$	$[-2x(x^4 - 6x^3 + 2x^2 - 10x - 9)]$
(j)	$33x^5 + 36x^4 - 15x^3 - 12x^2 + 24x =$	$[3x(11x^4 + 12x^3 - 5x^2 - 4x + 8)]$
(k)	$-30x^5 - 66x^4 - 72x^3 + 24x^2 - 6x =$	$[-6x(5x^4 + 11x^3 + 12x^2 - 4x + 1)]$
(l)	$-12x^5 - 66x^4 + 24x^3 + 30x^2 + 30x =$	$[-6x(2x^4 + 11x^3 - 4x^2 - 5x - 5)]$
(m)	$-48x^5 - 66x^4 + 48x^3 + 18x^2 + 24x =$	$[-6x(8x^4 + 11x^3 - 8x^2 - 3x - 4)]$
(n)	$-16x^5 - 4x^4 - 24x^3 - 14x^2 + 20x =$	$[-2x(8x^4 + 2x^3 + 12x^2 + 7x - 10)]$
(o)	$11x^{10} - 2x^9 + 3x^8 + 4x^7 + 10x^6 =$	$[x^6(11x^4 - 2x^3 + 3x^2 + 4x + 10)]$
(p)	$24x^6 + 33x^5 + 24x^4 - 3x^3 + 27x^2 =$	$[3x^2(8x^4 + 11x^3 + 8x^2 - x + 9)]$
(q)	$20x^9 + 5x^8 + 50x^7 + 55x^6 + 30x^5 =$	$[5x^5(4x^4 + x^3 + 10x^2 + 11x + 6)]$
(r)	$-20x^8 + 5x^7 + 55x^6 + 30x^5 + 5x^4 =$	$[-5x^4(4x^4 - x^3 - 11x^2 - 6x - 1)]$
(s)	$-25x^7 - 45x^6 - 40x^5 - 30x^4 - 30x^3 =$	$[-5x^3(5x^4 + 9x^3 + 8x^2 + 6x + 6)]$
(t)	$-12x^6 - 48x^5 + 28x^4 - 44x^3 - 8x^2 =$	$[-4x^2(3x^4 + 12x^3 - 7x^2 + 11x + 2)]$
(u)	$-32x^9 - 28x^8 - 16x^7 - 28x^6 - 48x^5 =$	$[-4x^5(8x^4 + 7x^3 + 4x^2 + 7x + 12)]$
(v)	$-72x^6 + 42x^5 - 36x^4 - 24x^3 + 12x^2 =$	$[-6x^2(12x^4 - 7x^3 + 6x^2 + 4x - 2)]$
(w)	$35x^6 - 10x^5 - 20x^4 + 5x^3 - 10x^2 =$	$[5x^2(x-1)(7x^3 + 5x^2 + x + 2)]$

$$\begin{aligned} \text{(x)} \quad & -60x^8 + 45x^7 - 50x^6 - 30x^5 - 40x^4 = \\ \text{(y)} \quad & -16x^5 + 44x^4 - 48x^3 - 28x^2 + 48x = \\ \text{(z)} \quad & -12x^6 - 28x^5 + 44x^4 - 48x^3 - 48x^2 = \end{aligned}$$

$$\begin{aligned} & [-5x^4(12x^4 - 9x^3 + 10x^2 + 6x + 8)] \\ & [-4x(x-1)(4x^3 - 7x^2 + 5x + 12)] \\ & [-4x^2(3x^4 + 7x^3 - 11x^2 + 12x + 12)] \end{aligned}$$

16. Scomponi i seguenti polinomi con il raccoglimento a fattore comune.

$$\begin{aligned} \text{(a)} \quad & 5x^5 - 6x^4 + 11x^3 - 11x^2 - x = \\ \text{(b)} \quad & 8x^9 - 12x^8 + 32x^7 - 20x^6 + 8x^5 = \\ \text{(c)} \quad & -4x^9 + 16x^8 - 2x^7 + 8x^6 - 14x^5 = \\ \text{(d)} \quad & 8x^6 - 4x^5 - 16x^4 - 14x^3 + 24x^2 = \\ \text{(e)} \quad & 21x^6 + 15x^5 - 27x^4 - 18x^3 - 33x^2 = \\ \text{(f)} \quad & -10x^9 - 5x^8 + 7x^7 + 5x^6 + 3x^5 = \\ \text{(g)} \quad & -6x^7 + 48x^6 - 6x^5 - 48x^4 + 12x^3 = \\ \text{(h)} \quad & \frac{12x^{10}}{5} - \frac{x^9}{5} + \frac{9x^7}{5} - \frac{3x^6}{5} = \\ \text{(i)} \quad & \frac{3x^5}{2} + 9x^4 + 6x^3 + \frac{3x^2}{2} + \frac{27x}{2} = \\ \text{(j)} \quad & -12x^7 - \frac{40x^6}{3} - 12x^5 + 12x^4 - 8x^3 = \\ \text{(k)} \quad & -3x^5 + 4x^4 + \frac{8x^3}{3} - \frac{x^2}{3} - \frac{7x}{3} = \\ \text{(l)} \quad & -\frac{8x^5}{3} + \frac{11x^4}{3} + \frac{11x^3}{3} + 2x^2 + x = \\ \text{(m)} \quad & -\frac{24x^9}{5} + 12x^8 - \frac{12x^7}{5} - 12x^6 - 6x^5 = \\ \text{(n)} \quad & -x^6 - 4x^5 - \frac{8x^4}{3} + \frac{5x^3}{3} - \frac{4x^2}{3} = \\ \text{(o)} \quad & 4x^6 + \frac{16x^5}{3} + \frac{2x^4}{3} - \frac{14x^3}{3} + 8x^2 = \\ \text{(p)} \quad & -12x^5 + \frac{9x^4}{2} - 15x^3 + \frac{33x^2}{2} - \frac{9x}{2} = \\ \text{(q)} \quad & 3x^9 - \frac{36x^8}{5} + \frac{18x^7}{5} + 6x^6 + \frac{9x^5}{5} = \\ \text{(r)} \quad & 5x^9 + \frac{15x^8}{2} + \frac{15x^7}{4} - \frac{25x^6}{2} + 15x^5 = \\ \text{(s)} \quad & -\frac{5x^{10}}{3} - \frac{8x^9}{3} - x^8 - \frac{11x^7}{3} - \frac{x^6}{3} = \\ \text{(t)} \quad & -\frac{4x^{10}}{3} + \frac{5x^9}{3} + 2x^8 + \frac{5x^7}{3} + \frac{2x^6}{3} = \\ \text{(u)} \quad & -\frac{5x^6}{3} + \frac{10x^5}{3} - \frac{10x^4}{3} - \frac{25x^3}{3} + 5x^2 = \\ \text{(v)} \quad & 15x^9 - \frac{25x^8}{3} - \frac{35x^7}{3} + \frac{35x^6}{3} + \frac{55x^5}{3} = \\ \text{(w)} \quad & -18x^5 + \frac{21x^4}{2} + \frac{33x^3}{2} - \frac{9x^2}{2} - \frac{9x}{2} = \\ \text{(x)} \quad & \frac{16x^6}{5} + \frac{36x^5}{5} + \frac{8x^4}{5} - \frac{44x^3}{5} + \frac{8x^2}{5} = \\ \text{(y)} \quad & \frac{x^{10}}{5} - \frac{8x^9}{5} + \frac{2x^8}{5} - \frac{6x^7}{5} + \frac{11x^6}{5} = \\ \text{(z)} \quad & -\frac{3x^{10}}{4} + \frac{5x^9}{2} + \frac{11x^8}{4} + \frac{5x^7}{2} - \frac{5x^6}{4} = \end{aligned}$$

$$\begin{aligned} & [x(5x^4 - 6x^3 + 11x^2 - 11x - 1)] \\ & [4x^5(2x^4 - 3x^3 + 8x^2 - 5x + 2)] \\ & [-2x^5(2x^4 - 8x^3 + x^2 - 4x + 7)] \\ & [2x^2(4x^4 - 2x^3 - 8x^2 - 7x + 12)] \\ & [3x^2(7x^4 + 5x^3 - 9x^2 - 6x - 11)] \\ & [-x^5(x-1)(x+1)(10x^2 + 5x + 3)] \\ & [-6x^3(x-1)(x+1)(x^2 - 8x + 2)] \\ & \left[\frac{x^6(12x^4 - x^3 + 9x - 3)}{5} \right] \\ & \left[\frac{3x(x^4 + 6x^3 + 4x^2 + x + 9)}{2} \right] \\ & \left[-\frac{4x^3(9x^4 + 10x^3 + 9x^2 - 9x + 6)}{3} \right] \\ & \left[-\frac{x(9x^4 - 12x^3 - 8x^2 + x + 7)}{3} \right] \\ & \left[-\frac{x(8x^4 - 11x^3 - 11x^2 - 6x - 3)}{3} \right] \\ & \left[-\frac{6x^5(4x^4 - 10x^3 + 2x^2 + 10x + 5)}{5} \right] \\ & \left[-\frac{x^2(3x^4 + 12x^3 + 8x^2 - 5x + 4)}{3} \right] \\ & \left[\frac{2x^2(6x^4 + 8x^3 + x^2 - 7x + 12)}{3} \right] \\ & \left[-\frac{3x(8x^4 - 3x^3 + 10x^2 - 11x + 3)}{2} \right] \\ & \left[\frac{3x^5(5x^4 - 12x^3 + 6x^2 + 10x + 3)}{5} \right] \\ & \left[\frac{5x^5(4x^4 + 6x^3 + 3x^2 - 10x + 12)}{4} \right] \\ & \left[-\frac{x^6(5x^4 + 8x^3 + 3x^2 + 11x + 1)}{3} \right] \\ & \left[-\frac{x^6(4x^4 - 5x^3 - 6x^2 - 5x - 2)}{3} \right] \\ & \left[-\frac{5x^2(x^4 - 2x^3 + 2x^2 + 5x - 3)}{3} \right] \\ & \left[\frac{5x^5(9x^4 - 5x^3 - 7x^2 + 7x + 11)}{3} \right] \\ & \left[-\frac{3x(x-1)(12x^3 + 5x^2 - 6x - 3)}{2} \right] \\ & \left[\frac{4x^2(4x^4 + 9x^3 + 2x^2 - 11x + 2)}{5} \right] \\ & \left[\frac{x^6(x-1)(x^3 - 7x^2 - 5x - 11)}{5} \right] \\ & \left[-\frac{x^6(3x^4 - 10x^3 - 11x^2 - 10x + 5)}{4} \right] \end{aligned}$$

17. Scomponi i seguenti polinomi.

$$\begin{aligned} \text{(a)} \quad & x^3 + x^2 + x + 1 = \\ \text{(b)} \quad & x^3 - 5x^2 + x - 5 = \\ \text{(c)} \quad & x^3 - 4x^2 + x - 4 = \end{aligned}$$

$$\begin{aligned} & [(x+1)(x^2+1)] \\ & [(x-5)(x^2+1)] \\ & [(x-4)(x^2+1)] \end{aligned}$$

(d) $-x^3 - 8x^2 - x - 8 =$	$[-(x+8)(x^2+1)]$
(e) $9x^3 + 4x^2 + 9x + 4 =$	$[(9x+4)(x^2+1)]$
(f) $9x^3 + 7x^2 + 9x + 7 =$	$[(9x+7)(x^2+1)]$
(g) $8x^3 - 8x^2 + 8x - 8 =$	$[8(x-1)(x^2+1)]$
(h) $9x^3 - 5x^2 + 9x - 5 =$	$[(9x-5)(x^2+1)]$
(i) $2x^3 + 5x^2 + 2x + 5 =$	$[(2x+5)(x^2+1)]$
(j) $4x^3 - 4x^2 + 4x - 4 =$	$[4(x-1)(x^2+1)]$
(k) $-6x^3 - x^2 - 6x - 1 =$	$[-(6x+1)(x^2+1)]$
(l) $6x^3 - 4x^2 + 6x - 4 =$	$[2(3x-2)(x^2+1)]$
(m) $10x^3 - 7x^2 + 10x - 7 =$	$[(10x-7)(x^2+1)]$
(n) $6x^3 + 11x^2 + 6x + 11 =$	$[(6x+11)(x^2+1)]$
(o) $12x^3 + 9x^2 + 12x + 9 =$	$[3(4x+3)(x^2+1)]$
(p) $-5x^3 - 3x^2 - 5x - 3 =$	$[-(5x+3)(x^2+1)]$
(q) $10x^3 - 2x^2 + 10x - 2 =$	$[2(5x-1)(x^2+1)]$
(r) $10x^3 - 10x^2 + 10x - 10 =$	$[10(x-1)(x^2+1)]$
(s) $-6x^3 - 9x^2 - 6x - 9 =$	$[-3(2x+3)(x^2+1)]$
(t) $-6x^3 + 12x^2 - 6x + 12 =$	$[-6(x-2)(x^2+1)]$
(u) $-7x^3 + 11x^2 - 7x + 11 =$	$[-(7x-11)(x^2+1)]$
(v) $-11x^3 + 4x^2 - 11x + 4 =$	$[-(11x-4)(x^2+1)]$
(w) $-12x^3 + 7x^2 - 12x + 7 =$	$[-(12x-7)(x^2+1)]$
(x) $-8x^3 - 11x^2 - 8x - 11 =$	$[-(8x+11)(x^2+1)]$
(y) $-6x^3 + 10x^2 - 6x + 10 =$	$[-2(3x-5)(x^2+1)]$
(z) $-10x^3 + 12x^2 - 10x + 12 =$	$[-2(5x-6)(x^2+1)]$

18. Scomponi i seguenti polinomi.

(a) $-x^3 + 2x^2 - x + 2 =$	$[-(x-2)(x^2+1)]$
(b) $-2x^3 - 3x^2 - 2x - 3 =$	$[-(2x+3)(x^2+1)]$
(c) $\frac{x^3}{4} - 9x^2 + \frac{x}{4} - 9 =$	$[\frac{(x-36)(x^2+1)}{4}]$
(d) $x^3 + \frac{2x^2}{3} + x + \frac{2}{3} =$	$[\frac{(3x+2)(x^2+1)}{3}]$
(e) $-x^3 + \frac{11x^2}{3} - x + \frac{11}{3} =$	$[-\frac{(3x-11)(x^2+1)}{3}]$
(f) $2x^3 - \frac{11x^2}{9} + 2x - \frac{11}{9} =$	$[\frac{(18x-11)(x^2+1)}{9}]$
(g) $-3x^3 + \frac{7x^2}{3} - 3x + \frac{7}{3} =$	$[-\frac{(9x-7)(x^2+1)}{3}]$
(h) $-\frac{11x^3}{7} + x^2 - \frac{11x}{7} + 1 =$	$[-\frac{(11x-7)(x^2+1)}{7}]$
(i) $-\frac{3x^3}{4} + 9x^2 - \frac{3x}{4} + 9 =$	$[-\frac{3(x-12)(x^2+1)}{4}]$
(j) $-\frac{x^3}{3} + \frac{3x^2}{2} - \frac{x}{3} + \frac{3}{2} =$	$[-\frac{(2x-9)(x^2+1)}{6}]$
(k) $\frac{5x^3}{6} + \frac{3x^2}{4} + \frac{5x}{6} + \frac{3}{4} =$	$[\frac{(10x+9)(x^2+1)}{12}]$
(l) $\frac{7x^3}{3} + \frac{7x^2}{5} + \frac{7x}{3} + \frac{7}{5} =$	$[\frac{7(5x+3)(x^2+1)}{15}]$
(m) $\frac{4x^3}{7} + \frac{4x^2}{5} + \frac{4x}{7} + \frac{4}{5} =$	$[\frac{4(5x+7)(x^2+1)}{35}]$

(n)	$\frac{3x^3}{5} - \frac{9x^2}{8} + \frac{3x}{5} - \frac{9}{8} =$	$[\frac{3(8x-15)(x^2+1)}{40}]$
(o)	$-\frac{7x^3}{4} - \frac{3x^2}{4} - \frac{7x}{4} - \frac{3}{4} =$	$[-\frac{(7x+3)(x^2+1)}{4}]$
(p)	$\frac{5x^3}{3} - \frac{7x^2}{12} + \frac{5x}{3} - \frac{7}{12} =$	$[\frac{(20x-7)(x^2+1)}{12}]$
(q)	$\frac{6x^3}{5} - \frac{11x^2}{9} + \frac{6x}{5} - \frac{11}{9} =$	$[\frac{(54x-55)(x^2+1)}{45}]$
(r)	$-\frac{5x^3}{2} - \frac{4x^2}{9} - \frac{5x}{2} - \frac{4}{9} =$	$[-\frac{(45x+8)(x^2+1)}{18}]$
(s)	$-\frac{3x^3}{4} + \frac{8x^2}{5} - \frac{3x}{4} + \frac{8}{5} =$	$[-\frac{(15x-32)(x^2+1)}{20}]$
(t)	$-\frac{3x^3}{2} - \frac{8x^2}{7} - \frac{3x}{2} - \frac{8}{7} =$	$[-\frac{(21x+16)(x^2+1)}{14}]$
(u)	$-\frac{4x^3}{9} + \frac{7x^2}{8} - \frac{4x}{9} + \frac{7}{8} =$	$[-\frac{(32x-63)(x^2+1)}{72}]$
(v)	$-\frac{4x^3}{5} + \frac{9x^2}{4} - \frac{4x}{5} + \frac{9}{4} =$	$[-\frac{(16x-45)(x^2+1)}{20}]$
(w)	$-\frac{3x^3}{5} - \frac{2x^2}{9} - \frac{3x}{5} - \frac{2}{9} =$	$[-\frac{(27x+10)(x^2+1)}{45}]$
(x)	$\frac{11x^3}{5} - \frac{7x^2}{12} + \frac{11x}{5} - \frac{7}{12} =$	$[\frac{(132x-35)(x^2+1)}{60}]$
(y)	$-\frac{2x^3}{11} + \frac{11x^2}{9} - \frac{2x}{11} + \frac{11}{9} =$	$[-\frac{(18x-121)(x^2+1)}{99}]$
(z)	$-\frac{12x^3}{11} + \frac{3x^2}{4} - \frac{12x}{11} + \frac{3}{4} =$	$[-\frac{3(16x-11)(x^2+1)}{44}]$

19. Scomponi i seguenti polinomi usando la regola di Ruffini.

(a)	$x^2 - 12x + 36 =$	$[(x - 6)^2]$
(b)	$x^2 - 10x + 24 =$	$[(x - 6)(x - 4)]$
(c)	$-x^2 + x + 6 =$	$[-(x - 3)(x + 2)]$
(d)	$-x^2 - x + 12 =$	$[-(x - 3)(x + 4)]$
(e)	$-x^2 + 4x + 12 =$	$[-(x - 6)(x + 2)]$
(f)	$2x^2 + 13x + 6 =$	$[(x + 6)(2x + 1)]$
(g)	$3x^2 - 11x - 4 =$	$[(x - 4)(3x + 1)]$
(h)	$3x^2 + 10x - 8 =$	$[(x + 4)(3x - 2)]$
(i)	$-x^2 + 7x - 12 =$	$[-(x - 4)(x - 3)]$
(j)	$2x^2 - 11x - 6 =$	$[(x - 6)(2x + 1)]$
(k)	$3x^3 - 9x + 6 =$	$[3(x - 1)^2(x + 2)]$
(l)	$2x^3 + x^2 - 3 =$	$[(x - 1)(2x^2 + 3x + 3)]$
(m)	$-x^3 + x^2 + 8x - 12 =$	$[-(x - 2)^2(x + 3)]$
(n)	$x^3 - 8x^2 + 10x + 4 =$	$[(x - 2)(x^2 - 6x - 2)]$
(o)	$x^3 + 2x^2 - 27x - 18 =$	$[(x + 6)(x^2 - 4x - 3)]$
(p)	$-x^3 + 19x + 30 =$	$[-(x - 5)(x + 2)(x + 3)]$
(q)	$3x^3 - 16x^2 + 11x + 20 =$	$[(x - 4)(3x^2 - 4x - 5)]$
(r)	$2x^4 + 3x^3 - 2x^2 + 3 =$	$[(x + 1)(2x^3 + x^2 - 3x + 3)]$
(s)	$x^4 - 7x^3 + 5x^2 - x + 2 =$	$[(x - 1)(x^3 - 6x^2 - x - 2)]$
(t)	$2x^4 + 9x^3 + 5x^2 + 8x + 16 =$	$[(x + 4)(2x^3 + x^2 + x + 4)]$
(u)	$2x^4 - 2x^3 - x^2 - 9x + 6 =$	$[(x - 2)(2x^3 + 2x^2 + 3x - 3)]$
(v)	$x^4 - 9x^3 + 23x^2 - 14x + 8 =$	$[(x - 4)(x^3 - 5x^2 + 3x - 2)]$

(w) $x^4 + 3x^3 - 14x^2 - 23x - 15 =$	$[(x+5)(x^3 - 2x^2 - 4x - 3)]$
(x) $3x^4 - 11x^3 + x^2 + 13x + 6 =$	$[(x-3)(3x^3 - 2x^2 - 5x - 2)]$
(y) $2x^4 - 8x^3 + 9x^2 - 7x - 6 =$	$[(x-3)(2x^3 - 2x^2 + 3x + 2)]$
(z) $-x^4 - 6x^3 - 6x^2 + 3x - 2 =$	$[-(x+2)(x^3 + 4x^2 - 2x + 1)]$

20. Scomponi i seguenti polinomi.

(a) $36x^4 - 48x^3 - 32x^2 + 32x + 16 =$	$[4(3x^2 - 2x - 2)^2]$
(b) $\frac{9x^4}{4} - x^3 - \frac{53x^2}{9} + \frac{4x}{3} + 4 =$	$[\frac{(9x^2 - 2x - 12)^2}{36}]$
(c) $25x^4 + 60x^3 - 14x^2 - 60x + 25 =$	$[(5x^2 + 6x - 5)^2]$
(d) $\frac{x^4}{36} - \frac{x^3}{3} + 3x^2 - 12x + 36 =$	$[\frac{(x^2 - 6x + 36)^2}{36}]$
(e) $-243x^5 + 1215x^4 - 2430x^3 + 2430x^2 - 1215x + 243 =$	$[-243(x-1)^5]$
(f) $-48x^7 - 36x^6 + 32x^4 + 4x^3 =$	$[-4x^3(12x^4 + 9x^3 - 8x - 1)]$
(g) $\frac{64x^2}{81} - \frac{4}{9} =$	$[\frac{4(4x-3)(4x+3)}{81}]$
(h) $x^2 - 17x + 60 =$	$[(x-12)(x-5)]$
(i) $36x^4 - 72x^3 + 36x + 9 =$	$[9(2x^2 - 2x - 1)^2]$
(j) $12x^3 + 12x^2 + 12x + 12 =$	$[12(x+1)(x^2+1)]$
(k) $-125x^3 + 225x^2 - 135x + 27 =$	$[-(5x-3)^3]$
(l) $\frac{5x^3}{3} + \frac{x^2}{10} + \frac{5x}{3} + \frac{1}{10} =$	$[\frac{(50x+3)(x^2+1)}{30}]$
(m) $-10x^3 + 10x^2 - 10x + 10 =$	$[-10(x-1)(x^2+1)]$
(n) $42x^9 + 54x^8 - 18x^7 - 18x^6 + 54x^5 =$	$[6x^5(7x^4 + 9x^3 - 3x^2 - 3x + 9)]$
(o) $4x^2 - \frac{1}{16} =$	$[\frac{(8x-1)(8x+1)}{16}]$
(p) $25x^4 - 50x^3 - 25x^2 + 50x + 25 =$	$[25(x^2 - x - 1)^2]$
(q) $-8x^3 - 12x^2 - 6x - 1 =$	$[-(2x+1)^3]$
(r) $x^2 - 3x - 70 =$	$[(x-10)(x+7)]$
(s) $125x^3 - 45x^2 + \frac{27x}{5} - \frac{27}{125} =$	$[\frac{(25x-3)^3}{125}]$
(t) $\frac{x^3}{4} - \frac{9x^2}{10} + \frac{x}{4} - \frac{9}{10} =$	$[\frac{(5x-18)(x^2+1)}{20}]$
(u) $81x^2 - 100 =$	$[(9x-10)(9x+10)]$
(v) $16x^4 - 40x^3 - 15x^2 + 50x + 25 =$	$[(4x^2 - 5x - 5)^2]$
(w) $x^5 - 10x^4 + 40x^3 - 80x^2 + 80x - 32 =$	$[(x-2)^5]$
(x) $x^8 + 8x^7 - 9x^6 + 12x^5 - 11x^4 =$	$[x^4(x^4 + 8x^3 - 9x^2 + 12x - 11)]$
(y) $-32x^5 - 160x^4 - 320x^3 - 320x^2 - 160x - 32 =$	$[-32(x+1)^5]$
(z) $x^2 + \frac{2x}{3} - \frac{1}{3} =$	$[\frac{(x+1)(3x-1)}{3}]$