

### Coletando coeficientes de uma expressão

*restart;*

$f := x(x+1) + y(x+1);$

$$x(x+1) + y(x+1) \quad (1)$$

$\text{coeff}(f, x);$

$$1 + y \quad (2)$$

$\text{coeff}(f, y);$

$$x + 1 \quad (3)$$

$g := x \cdot (y \cdot x + y^2) + (y + x^2 \cdot y)$

$$x(yx + y^2) + y + x^2y \quad (4)$$

$h := f = g$

$$x(x+1) + y(x+1) = x(yx + y^2) + y + x^2y \quad (5)$$

$\text{coeff}(\text{lhs}(h), x) = \text{coeff}(\text{rhs}(h), x)$

$$1 + y = y^2 \quad (6)$$

$\text{coeff}(\text{lhs}(h), x^2) = \text{coeff}(\text{rhs}(h), x^2)$

$$1 = 2y \quad (7)$$

### Combinar termos de diferentes expressões em uma unica expressão

*restart;*

$f := (x) \rightarrow \sin(x)$

$$x \rightarrow \sin(x) \quad (8)$$

$f(a)$

$$\sin(a) \quad (9)$$

$g := (x) \rightarrow \cos(x)$

$$x \rightarrow \cos(x) \quad (10)$$

$g(a)$

$$\cos(a) \quad (11)$$

$h := (x) \rightarrow \text{combine}(f(x) + g(x))$

$$x \rightarrow \text{combine}(f(x) + g(x)) \quad (12)$$

$h(a)$

$$\sin(a) + \cos(a) \quad (13)$$

### Converter uma expressão para um forma diferente

*restart;*

$\text{convert}(9, \text{binary});$

$$1001 \quad (14)$$

$\text{convert}\left(\frac{1}{8}, \text{float}, 4\right)$

$$0.1250 \quad (15)$$

$\text{convert}(\text{"XX"}, \text{arabic})$

$$20 \quad (16)$$

$f := \frac{x^3 + x}{x^2 - 1}$

$$\frac{x^3 + x}{x^2 - 1} \quad (17)$$

*convert(f, parfrac, x)*

$$x + \frac{1}{x-1} + \frac{1}{x+1} \quad (18)$$

### Expandir uma expressão

*restart;*

*expand((x + 1) (x + 2))*

$$x^2 + 3x + 2 \quad (19)$$

*expand(sin(x + y))*

$$\sin(x) \cos(y) + \cos(x) \sin(y) \quad (20)$$

*expand((x + 1) (y + z) · (z + 1), (x + 1))*

$$(x + 1) yz + (x + 1) y + (x + 1) z^2 + (x + 1) z \quad (21)$$

### Fatoração de um polinomio

*restart*

*factor* $\left(\frac{x^3 - y^3}{x^4 - y^4}\right)$

$$\frac{x^2 + xy + y^2}{(y + x) (x^2 + y^2)} \quad (22)$$

*factor(x<sup>3</sup> + 5)*

$$x^3 + 5 \quad (23)$$

*factor(x<sup>3</sup> + 5.0)*

$$(x + 1.709975947) (x^2 - 1.709975947 x + 2.924017740) \quad (24)$$

### Substituindo uma subexpressão em uma expressão

*restart*

*subs(x = a, x<sup>2</sup> + x + 1)*

$$a^2 + a + 1 \quad (25)$$

*f := x + y + z*

$$x + y + z \quad (26)$$

*g := x - y*

$$x - y \quad (27)$$

*subs(z = g, f)*

$$2x \quad (28)$$

### Expansão em serie de Taylor

*restart*

*series(exp(x), x, 6)*

$$1 + x + \frac{1}{2} x^2 + \frac{1}{6} x^3 + \frac{1}{24} x^4 + \frac{1}{120} x^5 + O(x^6) \quad (29)$$

*series(exp(x), x = 2)*

$$e^2 + e^2 (x - 2) + \frac{1}{2} e^2 (x - 2)^2 + \frac{1}{6} e^2 (x - 2)^3 + \frac{1}{24} e^2 (x - 2)^4 + \frac{1}{120} e^2 (x - 2)^5 + O((x - 2)^6) \quad (30)$$

*series(f(x), x = x0)*

$$f(x_0) + D(f)(x_0)(x-x_0) + \frac{1}{2} D^{(2)}(f)(x_0)(x-x_0)^2 + \frac{1}{6} D^{(3)}(f)(x_0)(x-x_0)^3 + \frac{1}{24} D^{(4)}(f)(x_0)(x-x_0)^4 + \frac{1}{120} D^{(5)}(f)(x_0)(x-x_0)^5 + O((x-x_0)^6) \quad (31)$$

*series(f(x, y), [x=x0, y=y0])*

Error, invalid input: series received [x = x0, y = y0], which is not valid for its 2nd argument, eqn

*mtaylor(f(x, y), [x=x0, y=y0], 2)*

$$f(x_0, y_0) + D_1(f)(x_0, y_0)(x-x_0) + D_2(f)(x_0, y_0)(y-y_0) \quad (32)$$

### Transformadas

*restart*

*with(inttrans) :*

*laplace(exp(t), t, s)*

$$\frac{1}{s-1} \quad (33)$$

*invlaplace* $\left(\frac{1}{s-1}, s, t\right)$

$$e^t \quad (34)$$

*ztrans* $\left(\sin\left(\frac{\pi t}{2}\right), t, z\right)$

$$\frac{z}{z^2+1} \quad (35)$$

*invztrans* $\left(\frac{z}{z^2+1}, z, t\right)$

$$\sin\left(\frac{1}{2} \pi t\right) \quad (36)$$