

#2

$$eqn := diff(diff(y(x), x), x) + x \cdot diff(y(x), x) = 0$$

$$eqn := \frac{d^2}{dx^2} y(x) + x \left(\frac{d}{dx} y(x) \right) = 0 \quad (1.1)$$

dsolve is no help

$$dsolve(eqn)$$

$$y(x) = _C1 + \operatorname{erf}\left(\frac{\sqrt{2}}{2} x\right) _C2 \quad (1.1.1)$$

$$y := x \mapsto \sum_{k=0}^8 (c[k] \cdot x^k)$$

$$y := x \mapsto \sum_{k=0}^8 c_k \cdot x^k \quad (1.2)$$

$$yp := D(y)$$

$$yp := x \mapsto 8 \cdot x^7 \cdot c_8 + 7 \cdot x^6 \cdot c_7 + 6 \cdot x^5 \cdot c_6 + 5 \cdot x^4 \cdot c_5 + 4 \cdot x^3 \cdot c_4 + 3 \cdot x^2 \cdot c_3 + 2 \cdot x \cdot c_2 + c_1 \quad (1.3)$$

$$\operatorname{simplify}(yp(x))$$

$$8 x^7 c_8 + 7 x^6 c_7 + 6 x^5 c_6 + 5 x^4 c_5 + 4 x^3 c_4 + 3 x^2 c_3 + 2 x c_2 + c_1 \quad (1.4)$$

$$ypp := D(yp)$$

$$ypp := x \mapsto 56 \cdot x^6 \cdot c_8 + 42 \cdot x^5 \cdot c_7 + 30 \cdot x^4 \cdot c_6 + 20 \cdot x^3 \cdot c_5 + 12 \cdot x^2 \cdot c_4 + 6 \cdot x \cdot c_3 + 2 \cdot c_2 \quad (1.5)$$

$$\operatorname{normal}(ypp(x))$$

$$56 x^6 c_8 + 42 x^5 c_7 + 30 x^4 c_6 + 20 x^3 c_5 + 12 x^2 c_4 + 6 x c_3 + 2 c_2 \quad (1.6)$$

$$\operatorname{simplify}(\%)$$

$$56 x^6 c_8 + 42 x^5 c_7 + 30 x^4 c_6 + 20 x^3 c_5 + 12 x^2 c_4 + 6 x c_3 + 2 c_2 \quad (1.7)$$

$$ypp(x) + x \cdot y(x)$$

$$56 x^6 c_8 + 42 x^5 c_7 + 30 x^4 c_6 + 20 x^3 c_5 + 12 x^2 c_4 + 6 x c_3 + 2 c_2 + x (c_8 x^8 + c_7 x^7 + c_6 x^6 + c_5 x^5 + c_4 x^4 + c_3 x^3 + c_2 x^2 + c_1 x + c_0) \quad (1.8)$$

$$\operatorname{expand}(\%)$$

$$x^9 c_8 + x^8 c_7 + x^7 c_6 + x^6 c_5 + 56 x^6 c_8 + x^5 c_4 + 42 x^5 c_7 + x^4 c_3 + 30 x^4 c_6 + x^3 c_2 + 20 x^3 c_5 + x^2 c_1 + 12 x^2 c_4 + x c_0 + 6 x c_3 + 2 c_2 \quad (1.9)$$

$$\operatorname{sort}(\%, x, \operatorname{ascending})$$

$$2 c_2 + c_0 x + 6 c_3 x + c_1 x^2 + 12 c_4 x^2 + c_2 x^3 + 20 c_5 x^3 + c_3 x^4 + 30 c_6 x^4 + c_4 x^5 + 42 c_7 x^5 \quad (1.10)$$

$$+ c_5 x^6 + 56 c_8 x^6 + c_6 x^7 + c_7 x^8 + c_8 x^9$$

collect(% , x)

$$c_8 x^9 + c_7 x^8 + c_6 x^7 + (c_5 + 56 c_8) x^6 + (c_4 + 42 c_7) x^5 + (c_3 + 30 c_6) x^4 + (c_2 + 20 c_5) x^3 \quad (1.11)$$

$$+ (c_1 + 12 c_4) x^2 + (c_0 + 6 c_3) x + 2 c_2$$

sort(% , x, ascending)

$$2 c_2 + (c_0 + 6 c_3) x + (c_1 + 12 c_4) x^2 + (c_2 + 20 c_5) x^3 + (c_3 + 30 c_6) x^4 + (c_4 + 42 c_7) x^5 \quad (1.12)$$

$$+ (c_5 + 56 c_8) x^6 + c_6 x^7 + c_7 x^8 + c_8 x^9$$