

Soluções do Trabalho 1 de Cálculo IV

$$e) \frac{dy}{dx} + xy = 2y$$

$$\frac{dy}{dx} = y(2-x)$$

$$\frac{dy}{y} = (2-x) dx$$

$$\int \frac{dy}{y} = \int (2-x) dx$$

$$\ln|y| = 2x - \frac{x^2}{2} + C^*$$

$$|y| = e^{2x} e^{-\frac{x^2}{2}} e^{C^*}$$

$$y = \pm e^{2x} e^{-\frac{x^2}{2}} e^{C^*}$$

$$y = C e^{2x} e^{-x^2/2}$$

C positivo
ou negativo

Verificação:

$$y = C l e^{ax - x^2/2}$$

$$\frac{dy}{dx} = C(a - x) l e^{ax - x^2/2}$$

$$C(a - x) l e^{ax - x^2/2} + x C l e^{ax - x^2/2} = a C l e^{ax - x^2/2}$$

$$C a - C x + C x = C a \quad \underline{\text{OK}}$$

c) PVI

$$f(x_0) = f_0$$

$$ax_0 - \frac{x_0^2}{2}$$

$$f_0 = Cl$$

$$C = \frac{f_0}{\frac{ax_0 - \frac{x_0^2}{2}}{l}}$$

$$f = \frac{f_0}{\frac{ax - \frac{x^2}{2}}{l}}$$

d) Se $a=1$, $x_0=1$, $y_0=1$ enter

$$f = \frac{1}{e^{1-1/2}} e^{x - \frac{x^2}{2}} = e^{x - \frac{x^2}{2} - 1/2}$$

