

7. (a) IF:  $\mu = e^{3 \int dx} = e^{3x}$ ,  $\frac{d}{dx} [ye^{3x}] = 0$ ,  $ye^{3x} = C$ ,  $y = Ce^{-3x}$

separation of variables:  $\frac{dy}{y} = -3dx$ ,  $\ln |y| = -3x + C_1$ ,  $y = \pm e^{-3x} e^{C_1} = Ce^{-3x}$

including  $C = 0$  by inspection

(b) IF:  $\mu = e^{-2 \int dt} = e^{-2t}$ ,  $\frac{d}{dt} [ye^{-2t}] = 0$ ,  $ye^{-2t} = C$ ,  $y = Ce^{2t}$

separation of variables:  $\frac{dy}{y} = 2dt$ ,  $\ln |y| = 2t + C_1$ ,  $y = \pm e^{C_1} e^{2t} = Ce^{2t}$

including  $C = 0$  by inspection

8. (a) IF:  $\mu = e^{-4 \int x dx} = e^{-2x^2}$ ,  $\frac{d}{dx} [ye^{-2x^2}] = 0$ ,  $y = Ce^{2x^2}$

separation of variables:  $\frac{dy}{y} = 4x dx$ ,  $\ln |y| = 2x^2 + C_1$ ,  $y = \pm e^{C_1} e^{2x^2} = Ce^{2x^2}$

including  $C = 0$  by inspection

(b) IF:  $\mu = e^{\int dt} = e^t$ ,  $\frac{d}{dt} [ye^t] = 0$ ,  $y = Ce^{-t}$

separation of variables:  $\frac{dy}{y} = -dt$ ,  $\ln |y| = -t + C_1$ ,  $y = \pm e^{C_1} e^{-t} = Ce^{-t}$

including  $C = 0$  by inspection

9.  $\mu = e^{\int 4dx} = e^{4x}$ ,  $e^{4x}y = \int e^x dx = e^x + C$ ,  $y = e^{-3x} + Ce^{-4x}$

10.  $\mu = e^{2 \int x dx} = e^{x^2}$ ,  $\frac{d}{dx} [ye^{x^2}] = xe^{x^2}$ ,  $ye^{x^2} = \frac{1}{2}e^{x^2} + C$ ,  $y = \frac{1}{2} + Ce^{-x^2}$