Integrating factors

MAT 265, Spring 2017

Find the solution to each differential equation or IVP using the method of integrating factors. For each IVP, also give the largest interval I on which your solution is defined.

1. $\dfrac{dy}{dx} - y = \dfrac{11}{8}e^{-x/3}, \;\; y(0) = -1$
2. $(x^2+1)\dfrac{dy}{dx} + 3xy = 6x$
3. $xy' + y = 3xy, \;\; y(1) = 0$
4. $(1+x)\dfrac{dy}{dx} + y = \cos x, \;\; y(0) = 1$
5. $xy' = 3y + x^4 \cos x, \;\; y(2\pi) = 0$

ANSWERS

1. $y(x) = \dfrac{1}{32}e^{x} - \dfrac{33}{32}e^{-x/3}, \quad I = (-\infty, \infty)$
2. $y(x) = 2 + C(x^2 + 1)^{-3/2}$
3. $y(x) = 0, \quad I = (-\infty, \infty)$
4. $y(x) = \dfrac{1 + \sin x}{1 + x}, \quad I = (-1, \infty)$
5. $y(x) = x^3 \sin x, \quad I = (-\infty, \infty)$