

Homework 1 (Due: 10/13)

題號以第九版為準，若尚未有課本的同學可參考後面的題目 (但 HW2 以後將只公佈題號，請同學儘量手邊有課本)

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| (1) Sec. 2-2, 2, | (2) Sec. 2-2, 11, | (3) Sec. 2-2, 19, |
| (4) Sec. 2-2, 45, | (5) Sec. 2-3, 11, | (6) Sec. 2-3, 19, |
| (7) Sec. 2-3, 38, | (8) Sec. 2-3, 43, | (9) Sec. 3-1, 1 |

Note: (a) The solutions in (2) and (3) can be expressed by the implicit solution.

(b) $\frac{d}{dx} \tan x = \sec^2 x$, $\frac{d}{dx} \sec x = \sec x \tan x$ may be applied.

Sec 2-2

In Problems 1–22 solve the given differential equation by separation of variables.

2. $\frac{dy}{dx} = (x + 1)^2$

11. $\csc y \, dx + \sec^2 x \, dy = 0$

19. $\frac{dy}{dx} = \frac{xy + 3x - y - 3}{xy - 2x + 4y - 8}$

In Problems 45–50 use a technique of integration or a substitution to find an explicit solution of the given differential equation or initial-value problem.

45. $\frac{dy}{dx} = \frac{1}{1 + \sin x}$

Sec 2-3

In Problems 1–24 find the general solution of the given differential equation. Give the largest interval I over which the general solution is defined. Determine whether there are any transient terms in the general solution.

11. $x \frac{dy}{dx} + 4y = x^3 - x$

19. $(x + 1) \frac{dy}{dx} + (x + 2)y = 2xe^{-x}$

In Problems 37–40 proceed as in Example 6 to solve the given initial-value problem. Use a graphing utility to graph the continuous function $y(x)$.

38. $\frac{dy}{dx} + y = f(x), y(0) = 1$, where

$$f(x) = \begin{cases} 1, & 0 \leq x \leq 1 \\ -1, & x > 1 \end{cases}$$

43. Express the solution of the initial-value problem $y' - 2xy = 1, y(1) = 1$, in terms of $\operatorname{erf}(x)$.

Sec 3-1

1. The population of a community is known to increase at a rate proportional to the number of people present at time t . If an initial population P_0 has doubled in 5 years, how long will it take to triple? To quadruple?