

Tutorial exercises set 3: Analysis 2

Exercise 01:

Give the solutions of the following differential equations:

$$1) \frac{dy}{x} - x = 0$$

$$2) \frac{dy}{dx} - y = 0$$

Exercise 02:

Give the solution of the following differential equation:

$$(x + y)dx - xdy = 0$$

Exercise 03:

1) Solve the following differential equations:

$$a) y'(x^2 - 1) - 2xy = 0$$

$$b) \sqrt{y^2 + 1}dx = xydy$$

2) Find the particular solution of the differential equation:

$$(1 + e^x)yy' = e^x$$

with the condition $y(0) = 1$.

Exercise 04:

a) Solve the differential equation

$$(2x + y)dx - (4x - y)dy = 0$$

b) Find the particular solution of the differential equation:

$$ydx + (2\sqrt{xy} - x)dy = 0,$$

in $]0, +\infty[$, which satisfies the condition $y(1) = 1$.

Exercise 05:

Give the solution of the differential equation:

$$y' - \frac{x}{1 + x^2}y = x$$

Exercise 06:

Find the solution of the differential equation:

$$y'' - 2y' + 2y = 0$$

Exercise 07:

Solve the differential equation:

$$t^2 x - t^3 \frac{dx}{dt} = x^4 \cos t$$

Exercise 08:

Give the solutions of:

$$\begin{aligned} 1) \frac{dy}{dx} + 2xy &= 0 \\ 2) \frac{dy}{dx} + 2xy^2 &= 0 \end{aligned}$$

Exercise 09:

Find the solutions of:

$$\begin{aligned} 1) \frac{dy}{dy} &= y \sin(x) \\ 2) (1+x) \frac{dy}{dx} &= 4y \\ 3) 2\sqrt{x} \frac{dy}{dx} &= \sqrt{1-y^2} \end{aligned}$$

Exercise 10:

Solve:

$$2xy \frac{dy}{dx} = x^2 + 2y^2$$

Exercise 11:

Solve:

$$x \frac{dy}{dx} = y + 2\sqrt{xy}$$

Exercise 12:

Solve:

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

Exercise 13:

Solve:

$$\frac{dy}{dx} = y + y^3$$

Exercise 14:

Solve:

$$x^2 \frac{dy}{dx} + 2xy = 5y^3$$