

① Solve the following eqns.

$$(i) (x + xy^2) dx + e^{x^2} y dy = 0$$

$$(ii) \frac{dx}{dt} + x^2 = x$$

$$(iii) \sqrt{y} dx + (1+x) dy = 0$$
$$y(0) = 1$$

② Obtain the general solution to the eqns

$$(i) y \frac{dx}{dy} + 2x = 5y^3$$

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

$$(iii) \frac{dy}{dx} = x^2 e^{-4x} - 4y.$$

③ Solve the Bernoulli eqn

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

by substituting  $v = y^3$ .

④ Consider the eqn

$$(5x^2y + 6x^3y^2 + 4xy^2) dx$$

$$+ (2x^3 + 3x^4y + 3x^2y) dy = 0$$

① show that the eqn is not exact.

② Multiply the eqn by  $x^n y^m$  and determine values for  $n$  &  $m$  that make the eqn exact

③ Use the solution of the resulting exact eqn to solve the original eqn.

⑤ If  $xM(x,y) + yN(x,y) \equiv 0$

find the solution to the equation.

$$M(x,y) dx + N(x,y) dy = 0.$$