

$$\frac{u}{y} + \frac{x \cdot u/y}{y}$$

$$= -x \frac{u/y}{y^2} = \frac{\partial M}{\partial y}$$

2) Exact

$$\int x + y \cdot \frac{x}{y} + \int g dy = c$$

since all terms

contain x .

$$\int (x+y-10) dx + (x+y-2) dy = 0$$

$$\frac{\partial M}{\partial y} = 1$$

$$\frac{\partial N}{\partial x} = 1$$

\Rightarrow EDF

$$\frac{x^2}{2} + xy - 10x - \frac{y^2}{2} - 2y = c$$

$$[x^2 - y^2 + 2xy - 20x - 4y = c]$$

2 $(y^2 - x^2)dx + 2xydy = 0$

$$\frac{\partial M}{\partial y} = 2y$$

$$\frac{\partial N}{\partial x} = 2y$$

\Rightarrow EDE

~~$$y^3 - yx^2 + C = C$$~~

~~$$y^2x - \frac{x^3}{3} = C$$~~

$$\boxed{\frac{x^3}{3} = y^2x + C}$$

3 $(1 + 3e^{xy})dx + 3e^{xy}(1 - \frac{x}{y})dy = 0$

$$\frac{\partial M}{\partial y} = 3(-\frac{x}{y^2})e^{xy}$$

$$\frac{\partial N}{\partial x} = 3e^{xy/y} -$$

$$\left[\frac{y^{xy} + x^{xy}}{y^2} \right]$$

$$\Rightarrow \frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$$

4) EDF

$$x + 3ye^{x/y} = c$$

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

$$\frac{\partial M}{\partial y} = -1$$

$$\frac{\partial N}{\partial x} = -1$$

\Rightarrow EDF

$$x^2 - xy + \frac{y^2}{2} = c$$

$$5) (y \sec^2 x + \sec x \tan x) dx + (\tan x + 2y) dy$$

$$\frac{\partial M}{\partial y} = \sec^2 x$$

\Rightarrow EDF

$$\frac{\partial N}{\partial x} = \sec^2 x$$

$$y \tan x + \sec x + y^2 = c$$

$$6) (ax + by + g) dx + (hx + by + f) dy = 0$$

$$\frac{\partial M}{\partial y} = h \Rightarrow \text{E.O.E.}$$

$$\frac{\partial N}{\partial x} = h$$

$$ax^2 + bxy + cx + by^2 + d$$

$$[ax^2 + bxy + by^2 + cx + d] dy =$$

$$\int (x^4 - 2xy^2 + y^4) dx + (4xy^3 - 2x^2y + \sin y) dy =$$

$$\frac{\partial M}{\partial y} = -2xy + 4y^3$$

$$\frac{\partial N}{\partial x} = 4y^3 - 2xy$$

$$\Rightarrow \text{E.O.E.}$$

$$\frac{x^5}{5} - x^2y^2 + xy^4 + \cos y =$$

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$$My = 2x + cy$$

$$Nx = 2x + cy \Rightarrow \text{E.O.E.}$$

$$[x^2y + xcy = C]$$

$$M_x = 2x + 4y^2x$$

$$M_y = 2x + 4y^2x$$

$$M_y = N_x \Rightarrow \text{EDEF}$$

$$[x^2y + y^2x^2 = c]$$

$$M_y = 1 + \frac{-\sin y}{x}$$

$$N_x = 1 + \frac{-\sin y}{x}$$

$$\Rightarrow \text{EDEF}$$

$$[xy + y \ln x + x \cos y = c]$$

$$M_y = -6xy$$

$$N_x = -9xy$$

\Rightarrow Not exact differential eq