Petroleum engineering Third stage Engineering analysis

Lecture -3-

ا لعبقالعام

Dexact Diff equation

4 (x,y) dx + n(x,y) dy =0

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34 : 3x ... the equ is exact

 $\int_{a}^{x} M(x,y) dx + \int_{b}^{y} N(x,y) dy = \int_{0}^{a}$

Mysiff N(x,y) dy ep & (a) = (X) du copé de les siles et *

Show that the following equation are exact

To solve each one.

(2x+3y-2)dx + (3x-4y+1)dy =0

U= 2× +3y-2 = 34 ≈3

U= 3x-4y+1 => 3N = 3

 $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x} = 3$ = the equation is exact

 $\int (2x + 3y - 2) dx + \int (3a - 4y + 1) dy = 0$

 $x^2+3yx-2x$] + $\left[3ay-2y^2+y\right]=c$

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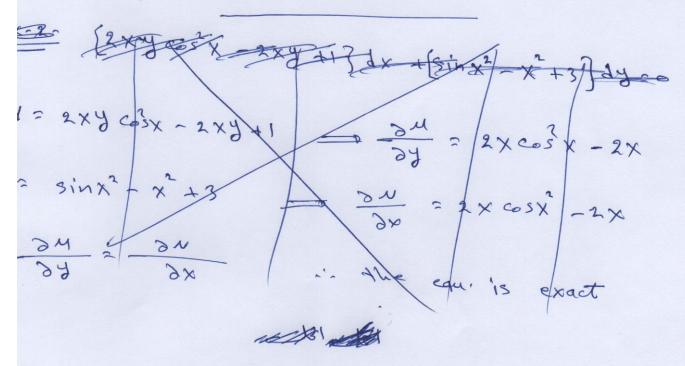
$$(x^{2}+3yx-2x)-(a^{2}+3ya-2a) + (3ay-2y^{2}+y)-(3ab-2b^{2}+b)$$

$$= c$$

$$+3yx-2x-a^{2}-3ya+2a+3ya-2y^{2}+y-3ab+2b^{2}+b=c$$

$$+3yx-2x-2y^{2}+y=c+a^{2}-2a+3ab-2b^{2}-b$$

$$+3yx-2x-2y^{2}+y=K$$



D. 10 . . .

Ex-2. (x+y) dx + (x+y2) dy =0

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... the equation is exact

$$\int_{a}^{x} (x+y) dx + \int_{b}^{y} (a+y^{2}) dy = 0$$

$$\left[\frac{x^2}{2} + xy\right]^{x} + \left[ay + \frac{y^3}{3}\right]^{y} = c$$

$$\left[\left(\frac{x^{2}}{2}+xy\right)-\left(\frac{a^{2}}{2}+ay\right)\right]+\left[\left(ay+\frac{y^{3}}{3}\right)-\left(ab+\frac{b^{2}}{3}\right)\right]=c$$

$$\frac{x^2}{2} + xy - \frac{a^2}{2} - ay + ay + \frac{3^3}{3} - ab - \frac{b^3}{3} = 0$$

$$\frac{x^{2}}{2} + xy + \frac{y^{3}}{3} = c + ab + \frac{b^{3}}{3}$$

$$\frac{\chi^{2}}{2} + \chi y + \frac{53}{3} = K$$

$$\frac{\xi \times -3}{2} = (2 \times e^{3} + \xi) dx + (\chi^{2} + 1) e^{3} dy = 0$$

$$\mathcal{M} = 2 \times e^{3} + e^{3} = 2 \times e^{3}$$

$$\frac{3\mathcal{M}}{3\mathcal{Y}} = 2 \times e^{3}$$

H.W

Integeration factor

- Bu + Du the equation is n't exact

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I. f= e F(x) dx

where $f(x) = \frac{3y}{3y} - \frac{3x}{3x}$

or I. F = e F(y) 4y

EX (x2+42+x) gx + xA gh = 0