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1. $3x^2y \, dy + (4x + 3y^2) = 0$

Jawab :

$M(x,y) = 4x + 3y^2 \rightarrow m_y = 3y$

$N(x,y) = 3x^2y \rightarrow N_x = 3xy$

$$\text{*} \quad \frac{m_y - N_x}{N} = \frac{3y - 3xy}{3x^2y}$$

$$= \frac{3 - 3x}{3x^2}$$

$$= \frac{3 - 3x}{3x \cdot x}$$

$$= \frac{3 - 0}{x}$$

$$= \frac{3}{x}$$

$m = e^{\int g(x) \, dx}$

$= e^{\int \frac{3}{x} \, dx}$ jadi Faktor Integrasinya

$= e^{3 \ln x}$ adalah x^3

$= x^3$

2. $\int \dfrac{\sqrt{25-x^2}}{x^2} dx$

Dit : Integral ?

Jawab !

$\int \dfrac{\sqrt{25-x^2}}{x^2} dx$

$= \int \sqrt{25-x^2} \cdot \dfrac{1}{x^2} dx$

$U = \sqrt{25-x^2} \qquad\qquad V = -\dfrac{1}{x}$

$du = \dfrac{1}{2\sqrt{25-x^2}} \times (-2x) dx \qquad dv = \dfrac{1}{x^2} dx$

$\int u \cdot du = u \cdot v - \int u \cdot du$

$= \sqrt{25-x^2} \left(-\dfrac{1}{x^2}\right) - \int \left(-\dfrac{1}{x^2}\right) \dfrac{1}{2\sqrt{25-x^2}} dx$

$= \sqrt{25-x^2} \cdot \left(-\dfrac{1}{x^2}\right) - \int \left(-\dfrac{1}{x^2}\right) \cdot \dfrac{1}{2\sqrt{25-x^2}} \cdot (2x) dx$

$= \sqrt{25-x^2} \left(-\dfrac{1}{x^2}\right) - \int \dfrac{1}{2\sqrt{25-x^2}} dx$

$= \dfrac{\sqrt{25-x^2}}{x} - \int \dfrac{1}{\sqrt{25-x^2}} dx$

$= \dfrac{\sqrt{25-x^2}}{x} - \arcsin\left(\dfrac{x}{5}\right)$

$= -\dfrac{\sqrt{25x^2}}{x} - \arcsin\left(\dfrac{x}{5}\right) + C$

Jadi Integral adalah $-\dfrac{\sqrt{25x^2}}{x} - \arcsin\left(\dfrac{x}{5}\right) + C$

③. $\int_0^1 3x^2 \sqrt{x^3+1} \, dx$

$= \int 3x^2 \sqrt{x^3+1} \, dx$

$= 3 \cdot \int x^2 \sqrt{x^3+1} \, dx$

$= 3 \cdot \int \frac{1}{3} \cdot \sqrt{x} \, dx$

$= 3 \cdot \frac{1}{3} \cdot \int \sqrt{x} \, dx$

$= 1 \cdot \int \sqrt{x} \, dx$

$= x^{\frac{1}{2}} \, dx$

$= \frac{2\sqrt{x} \cdot |x|}{3}$

$= \frac{2\sqrt{x^3+1} \cdot |x^3+1|}{3} = \frac{2\sqrt{x^2+1} \cdot |x^3+1|}{3} \Big|_0$

$= \frac{2\sqrt{1^3+1} \cdot |1^3+1|}{3} - \frac{2\sqrt{0^3+1} \cdot |0^3+1|}{3}$

$= \frac{2\sqrt{2} \cdot |2|}{3} - \frac{2\sqrt{1} \cdot |1|}{3}$

$= \frac{4\sqrt{2} - 2}{3}$

4. tentukan selang kemontotan, titik ekstrim,
kecekungan dan titik belok dari
$$f(x) = x^2 + 2x + 8$$

Jawab!

* $f(x) = x^2 + 2x + 8$
  $f'(x) = 2x + 2 + 0 +$
  $= 2x + 2$

  ~~titik ekstrim~~ simetri
  $2x = 0$
  $x = -2$

* titik ekstrim
  $f(x) = x^2 + 2x + 8$
  $f(-2) = (-2)^2 + 2(-2) + 8$
  $= 4 + (-4) + 8$
  $= 8$

* titik minimum dan maximum adalah
  $(-2, 8)$

* kemontotan

Selang	titik uji	$f'(x)$	tanda
$(-2, 8]$	-1	7	$+$

pembuatan

$$f(-1) = (-1)^2 + 2(-1) + 8$$
$$= 1 + (-2) + 8$$
$$= -1 + 8$$
$$= 7$$

* Kecekungannya keatas
* titik belok (-2,0)