Latihan

Derivatif Parsial

Soal

1. Find the domain of the given function.

$$f(x, y) = \sqrt{x^2 - 4y}$$

2. Identify and sketch the level curves (or contours) for the given function.

$$f(x, y, z) = x^2 + y^2 - z$$

3. Find $\dfrac{\partial z}{\partial x}$ and $\dfrac{\partial z}{\partial y}$ for the given function.

$$z^4 - y^2 + x^2 = 6x^2y^3z^7$$

4. Determine if $f(x, y) = \dfrac{x^2}{y^3}$ is increasing or decreasing at $(2, 5)$

   (a) if we allow x to vary and hold y fixed.

   (b) if we allow y to vary and hold x fixed.

5. Find $\dfrac{\partial^2 f}{\partial x^2}$, $\dfrac{\partial^2 f}{\partial x \partial y}$, $\dfrac{\partial^2 f}{\partial y \partial x}$, and $\dfrac{\partial^2 f}{\partial y^2}$ for the following function.

$$f(x, y) = xy^2 + xe^{x^2y} + \sin xy$$

6. Tentukan titik kritis $z = x^2 + y^2 + 4x - 6y - 18$

7. Gunakan metode least square untuk mendapatkan garis least square dari data berikut:

$$(0, 0), \quad (1, 1), \quad (2, 4), \quad (3, 9)$$

8. Tentukan nilai ekstrem lokal fungsi

$$f(x, y) = x^2 + 2y^2 + 2xy + 4x + 6y - 18$$

9. Given the following information to determine $\dfrac{dz}{dt}$

$$z = xe^{xy}, x = \ln(t^2 + 2), y = \sin t$$

10. Given the following information to determine $\dfrac{\partial z}{\partial t}$ and $\dfrac{\partial z}{\partial s}$

$$z = xy \sin e^x, \quad x = \ln(st), \quad y = s + t$$

11. Tentukan derivatif fungsi $f(x, y, z) = x^2y^3 - 4xz$ dengan arah searah vektor $\vec{v} = \langle -1, 2, 0 \rangle$.

12. Tentukan persamaan garis singgung pada elips $x^2 + 6y^2 = 4$ yang memiliki vektor arah $\vec{v} = 2\overline{i} + \overline{j}$

13. Find the equation of the tangent plane to $z = x^2 \cos(\pi y) - \dfrac{6}{xy^2}$ at $(2, -1)$

14. Misalkan α adalah perpotongan $f(x, y, x) = x^2 + y^2 - z = 0$ dan $g(x, y, x) = -x^2 - y^2 - z + 16 = 0$. Tentukan persamaan garis singgung di titik $P(2, 2, 8)$.

15. Find the linear approximation to $z = 4x^2 - y\mathbf{e}^{2x+y}$ at $(-2, 4)$

16. Find and classify all the critical points of the following functions.

$$f(x, y) = 3y^3 - x^2y^2 + 8y^2 + 4x^2 - 20y$$

17. Find the absolute minimum and absolute maximum of $f(x, y) = 192x^3 + y^2 - 4xy^2$ on the triangle with vertices $(0, 0), (4, 2)$ and $(-2, 2)$

18. Find the maximum and minimum values of $f(x, y, z) = y^2 - 10z$ subject to the constraint $x^2 + y^2 + z^2 = 36$

19. Find the maximum and minimum values of $f(x, y, z) = 3x^2 + y$ subject to the constraints $4x - 3y = 9$ and $x^2 + z^2 = 9$.

20. Tentukan titik pada bidang $\alpha x + 2y + 3z = 12$ yang memiliki jarak terdekat dengan titik $(1, 0, 1)$