p.944 (12.3)

Find all first-order partial derivatives.

$.f(x,y) = x^3 - 4xy^2 + y^4$

$7. f(x,y) = x^2 e^y - 4y$

$9. f(x,y) = x^2 \sin xy - 3y^3$

$11. f(x,y) = 4e^{x/y} - \dfrac{y}{x}$

$13. f(x,y,z) = 3x \sin y + 4x^3 y^2 z$

$15. f(x,y,z) = \dfrac{2}{\sqrt{x^2 + y^2 + z^2}}$

Find the indicated partial derivatives.

$7. f(x,y) = x^3 - 4xy^2 + 3y; \dfrac{\partial^2 f}{\partial x^2}, \dfrac{\partial^2 f}{\partial y^2}, \dfrac{\partial^2 f}{\partial y \partial x}$

$19. f(x,y) = x^4 - 3x^2 y^3 + 5y; f_{xx}, f_{xy}, f_{xyy}$

$21. f(x,y,z) = x^3 y^2 - \sin yz; f_{xx}, f_{yz}, f_{xyz}$

$23. f(x,y,z) = e^{2xy} - \dfrac{z^2}{y} + xz \sin y; f_{xx}, f_{yy}, f_{yyzz}$

$25. f(w,x,y,z) = w^2 xy - e^{wz}; f_{ww}, f_{wxy}, f_{wwxyz}$

(a) Sketch the graph of z=f(x,y) and (b) on this graph, highlight the appropriate two-dimensional trace and interpret the partial derivative as a slope.

$27. f(x,y) = 4 - x^2 - y^2, \dfrac{\partial f}{\partial x}(1,1)$

$29. f(x,y) = 4 - x^2 - y^2, \dfrac{\partial f}{\partial y}(1,1)$

$31. f(x,y) = 4 - x^2 - y^2, \dfrac{\partial f}{\partial y}(2,0)$

Find all points at which $\dfrac{\partial f}{\partial x} = \dfrac{\partial f}{\partial y} = 0$ and interpret the significance of the points graphically.

$39. f(x,y) = x^2 + y^2$

$41. f(x,y) = \sin x \sin y$

Use the contour plot to estimate $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ at the origin.

43. (Image in book)
45. (Image in book)

61. Suppose that three resistors are in parallel in an electrical circuit. If the resistance are R_1, R_2 and R_3 ohms, respectively, then the net resistance in the circuit equals $R = \frac{R_1 R_2 R_3}{R_1 R_2 + R_1 R_3 + R_2 R_3}$. Compute and interpret the partial derivative $\frac{\partial R}{\partial R_1}$. Given this partial derivative, explain how to quickly write down the partial derivatives $\frac{\partial R}{\partial R_2}$ and $\frac{\partial R}{\partial R_3}$.