EXERCISES #12

PARTIAL DERIVATIVES

Exercise 1. Find the indicated partial derivative.

(1) $f(x,y) = x^2y - 3y^4$, f_x
(2) $f(x,y) = \frac{x+y}{x-2y}$, f_y
(3) $f(x,y,z) = xy^2e^{-xz}$, f_z
(4) $f(x,y,z) = \ln(x+2y+3z)$, f_y
(5) $f(x,y) = xe^{y/x}$, $f_x(1,0)$
(6) $f(x,y) = x^4y^2 - x^3e^y$, f_{xy}
(7) $f(x,y) = \frac{y}{2x+3y}$, f_{xy}
(8) $f(x,y) = \sin(x^2-y^2)$, f_{xx}
(9) $f(x,y,z) = e^{xyz^2}$, f_{xyz}
(10) $f(x,y) = \sin(4x-3y)$, f_{xyx}
(11) $f(x,y,z) = e^{x+y} - e^{\sin(y-z)}$, f_{xyz}
(Hint: compute $(e^{x+y})_{xyz}$ and $(e^{\sin(y-z)})_{xyz}$ separately)

Exercise 2. Find all the second partial derivatives.

(1) $f(x,y) = \frac{x+y}{y^2-x}$
(2) $f(x,y) = 2e^{x^2+y^2}$
(3) $f(x,y,z) = 6e^x + 3xy - ye^{\sin(z)}$

Exercise 3. Use implicit differentiation to find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$.

(1) $x^2 - y^2 + z^2 - 2z = 4$
(2) $yz + x\ln y = z^2$
(3) $e^z = xyz$

Exercise 4. Use implicit differentiation to find $\frac{\partial^2 z}{\partial x \partial y}$.

(1) $x^2 - y^2 + z^2 - 2z = 4$
(2) $yz + x\ln y = z^2$
(3) $e^z = xyz$