

## Practice Problems-3

### Partial derivatives

EXERCISE 1. Find  $\frac{\partial z}{\partial x}$  and  $\frac{\partial z}{\partial y}$  for each of the following functions.

(a)  $z = x^2 y^4$ ,                      (b)  $z = (x^4 + x^2)y^3$ ,      (c)  $z = y^{\frac{1}{2}} \sin(x)$ .

(a)  $z = xy \cos(xy)$ ,      (b)  $z = \frac{x - y}{x + y}$ ,      (c)  $z = (3x + y)^2$ .

EXERCISE 2. Find  $\frac{\partial z}{\partial x}$  and  $\frac{\partial z}{\partial y}$  for each of the following functions.

(a)  $z = (x^2 + 3x) \sin(y)$ ,                      (b)  $z = \frac{\cos(x)}{y^5}$ ,      (c)  $z = \ln(xy)$ ,

(d)  $z = \sin(x) \cos(xy)$ ,                      (e)  $z = e^{(x^2 + y^2)}$ ,      (f)  $z = \sin(x^2 + y)$ .

Exercise 3. Verify Clairaut's theorem for each of the following functions.

(a)  $z = (x^2 + 3x) \sin(y)$ ,                      (b)  $z = \frac{\cos(x)}{y^5}$ ,      (c)  $z = \ln(xy)$ ,

(d)  $z = \sin(x) \cos(xy)$ ,                      (e)  $z = e^{(x^2 + y^2)}$ ,      (f)  $z = \sin(x^2 + y)$ .